

ELEKTROTECHNICKÝ

ZKUŠEBNÍ

ÚSTAV





Ref. Certif. No.

**CZ-1531-A1**IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST  
CERTIFICATES FOR ELECTRICAL EQUIPMENT  
(IECEE) CB SCHEMESYSTEME CEI D'ACCEPTATION MUTUELLE DE  
CERTIFICATS D'ESSAIS DES EQUIPEMENTS  
ELECTRIQUES (IECEE) METHODE OC**CB TEST CERTIFICATE  
CERTIFICAT D'ESSAI OC**Product  
ProduitCircuit-breakers for overcurrent protection for household  
and similar installationName and address of the applicant  
Nom et adresse du demandeurBONEGA, VELKOOBCHOD, spol. s r. o.  
Sudoměřice č.302, 696 66 Sudoměřice, Czech RepublicName and address of the manufacturer  
Nom et adresse du fabricantBONEGA, VELKOOBCHOD, spol. s r. o.  
Sudoměřice č.302, 696 66 Sudoměřice, Czech RepublicName and address of the factory  
Nom et adresse de l'usineBONEGA, VELKOOBCHOD, spol. s r. o.  
Sudoměřice č.302, 696 66 Sudoměřice, Czech RepublicRatings and principal characteristics  
Valeurs nominales et caractéristiques principalesAC 230/400 V(1p), 400 V(3p), 50/60 Hz,  
number of poles: 1, 1+N, 2, 3, 3+N, 4, char.: B, C, D,  
In:1, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63 A, 10 kATrademark (if any)  
Marque de fabrique (si elle existe)Model / Type Ref.  
Ref. De type

PEP-10J

Additional information (if necessary)  
Information complémentaire (si nécessaire)A sample of the product was tested and found  
to be in conformity with  
Un échantillon de ce produit a été essayé et a été  
considéré conforme à laAs shown in the Test Report Ref. No. which forms part  
of this Certificate  
Comme indiqué dans le Rapport d'essais numéro de  
référence qui constitue partie de ce Certificat**PUBLICATION****EDITION**

IEC 60898-1

1995

500097-01/01 of: 14.02.2005

This CB Test Certificate is issued by the National Certification Body  
Ce Certificat d'essai OC est établi par l'Organisme National de CertificationElektrotechnický zkušební ústav  
Pod lisem 129, 171 02 Praha 8 - Troja  
Czech Republic

Date: 2.3.2005

  
Signature: Pavel Kudrna  
Certification and Inspection Manager

**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No .....: 500097-01/ 01/1

Tested by (printed name and  
signature) .....

Jaroslav Klipa

Approved by (printed name and  
signature) .....

Jan Hlavatý

Date of issue .....: 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name .....: Elektrotechnický zkušební ústav

Address .....: Pod Lisem 129

Testing location .....: 171 02 Praha 71-Troja, Czech Republic

Applicant's Name .....: BONEGA Velkoobchod s.r.o.

Address .....: 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard .....: IEC 60898 (2 nd ed):1995

Test procedure .....: CB

Procedure deviation .....: N/A

Non-standard test method .....: N/A

**Test Report Form**

Test Report Form No. ....: 60898\_\_A/00-12

TRF originator .....: ÖVE

Master TRF .....: dated 00-07

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Test item description .....: Circuit breakers for overcurrent protection for household and similar installation

Trademark .....: BONEGA

Series .....: PEP-10J

Model and/or type reference .....: PEP-10J D 63 (1p)

Rating(s) .....: AC 230/400 V, 63 A, 50 Hz

Test items particulars:	
Type of circuit-breaker .....	for overcurrent protection for household and similar installations
Number of poles .....	single-pole
Protection against external influences .....	unenclosed
Method of mounting .....	panel board
Method of connection .....	not associated with the mechanical mounting
Instantaneous tripping current .....	D
Ambient air temperature (°C) .....	30
Energy limiting class .....	---
Rated short-circuit capacity (A) .....	10 000
Type of terminal .....	terminal with stirrup (indirect pressure)
Value of rated operational voltage .....	230/400 V
Value of rated current .....	63 A
Value of rated frequency .....	50 Hz
Test case verdicts	
Test case does not apply to the test object ..	N(.A.)
Test item does meet the requirement .....	P(ass)
Test item does not meet the requirement .....	F(ail)
Testing	
Date of receipt of test item .....	27.01.2005
Date(s) of performance of test .....	07.02. to 14.02.2005
General remarks	
This report shall not be reproduced except in full without the written approval of the testing laboratory.	
The test results presented in this report relate only to the item(s) tested.	
"(see remark #)" refers to a remark appended to the report.	
"(see Annex #)" refers to an annex appended to the report.	
Throughout this report a comma is used as the decimal separator.	

Copy of marking plate and summary of test results:

See Annex No:1/1-4 of Test Report No:500097-01/01/1

Photograph See Annex No:2/1 Test Report No:500097-01/01/1



IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
5.	MARKING AND OTHER INFORMATION		
	Circuit-breaker marked with:		
	a) Manufacturer's name or trade mark .....	BONEGA	P
	b) Type designation, catalogue number or other identification number .....	PEP-10J D 63 (1p)	P
	c) Rated voltage (V) .....	230/400	P
	d) Rated current (A) .....	63	P
	e) Rated frequency (Hz) .....	---	N
	f) Rated short circuit capacity (A) .....	10 000	P
	g) Wiring diagram	---	N
	h) Ambient air temperature, ..... if different from 30°C (°C)	---	N
	Symbol for instantaneous tripping current	D	P
	Symbol for nature of supply	~	P
	Marking for rated current and for instantaneous tripping shall be readily visible when CB is installed		P
	Other marking shall be easily discernible		P
	Energy limiting class	---	N
	I <sup>2</sup> t characteristic (documentation)	---	N
	Symbols on supply and load terminal	---	N
	Terminal for neutral conductor N	---	N
	Earthing terminal if any	---	N
	On - off position shall be clearly indicated - 0 I -		P
	For push-button CB the off push-button shall either be red or be marked with the symbol '0'	---	N
	Red not used for other push-button	---	N
	This symbol shall be easily discernible	---	N
	For CB with multiple current ratings, the maximum value is marked, the adjusted value indicated without ambiguity	---	N
	Marking shall be indelible and easily legible (not on removable parts), 15 s with water, 15 s with hexane (see cl. 8.3)		P
7.	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		
7.1.1	General		
7.1.2	Mechanism		

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
	The moving contact shall be mechanically coupled so that all poles make and break together, whether operated manually or automatically, even if an overload occurs on one pole only	---	N
	The switched neutral shall close before and open after the protected pole (s)	---	N
	Neutral pole having adequate making and breaking capacity and CB with independent manual operation: all poles operate together including neutral pole	---	N
	CB shall have a trip free mechanism		P
	It shall be possible to switch the CB on and off by hand		P
	No intermediate position of the contacts		P
	Position of contacts shall be indicated		P
	Indication visible from the outside		P
	If the indication is on the actuating means, it shall, when released, automatically take up or stay in the position corresponding to that of the moving contacts; operating means shall have two different rest positions, except that, for automatic operation, a third distinct rest position may be provided		P
	The action of the mechanism shall not be influenced by the position of enclosures		P
	If the cover is used as a guiding means for push-button, it shall not be possible to remove this button from the outside	---	N
	Operating means securely fixed, not possible to remove them without a tool		P
	For the up-down operating means the contacts shall be closed by the up movement.		P
7.1.3	Clearances [mm]		
	1.between live parts (of the main circuits) which are separated when the CB is in off position: 3 mm	>3	P
	2.between live parts of different polarity:..... 3 mm	---	N
	3.between live parts and:		
	- accessible surfaces of operating means: .3 mm	>3	P
	- screws or other means for fixing covers: ..3 mm	---	N
	- surface on which the base is mounted:6 (3) mm	>3	P
	- screws or other means for fixing the circuit breaker: ..... 6 (3) mm	>3	P
	- metal covers or boxes:..... 6 (3) mm	>3	P

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
	- other accessible metal parts: ..... 3 mm	---	N
	- metal frames supporting the base (flush-type): ..... 3 mm	---	N
	4. Between metal parts of mechanism and:		
	- accessible metal parts: ..... 3 mm	---	N
	- screws or other means for fixing the circuit breaker: ..... 3 mm	---	N
	- metal frames supporting the base (flush type): ..... 3 mm	---	N
7.1.3	Creepage distances [mm]		
	1. Between parts (of the main circuit) which are separated when the CB is in off position 3 mm	>3	P
	2. between live parts of different polarity $U_i \leq 250 \text{ V}$ ..... 3 mm $U_i > 250 \text{ V}$ ..... 4 mm	---	N
	3. between live parts and:		
	- accessible surfaces of operating means: . 3 mm	>3	P
	- screws or other means for fixing covers: .. 3 mm	---	N
	- screws or other means for fixing the CB: ..... 6 (3) mm	>3	P
	- accessible metal parts: ..... 3 mm	>3	P
	Note: Live parts in auxiliary circuits: in accordance with subclause 411.1.3.3 of IEC-Publ. 364-4-41		
7.1.4	Screws, current-carrying parts and connections		
7.1.4.1	Connections, withstand mechanical stresses occurring in normal use		P
	Screws for mounting of the CB not of the thread-cutting type	---	N
	Test according to cl. 8.4:		
	- 10 times (screw Ø / torque Nm)	Ø ____mm____Nm Ø ____mm____Nm	N
	- 5 times (screw Ø / torque Nm)	Ø 5,0 mm 2,0 Nm Ø ____mm____Nm	P
	Plug in connections tested by plugging in and pulling out five times	---	N
	After test connections have not become loose nor electrical function impaired		P
7.1.4.2	Screws with a thread of insulating material ensured correct introduction	---	N



IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
7.1.4.3	Electrical connection: contact pressure not transmitted through insulating material, unless there is sufficient resilience in the metallic parts		P
	- copper		P
	- alloy 58% copper for worked cold parts	---	N
	- alloy 50% copper for other parts	---	N
	- other metal		P
7.1.5	Terminals for external conductors		
7.1.5.1	Terminals ensure correct connection of conductors (Test acc. to cl. 8.5)		P
8.5	Torque Ø 5,0 mm 2,0 Nm Ø ___mm___Nm Ø ___mm___Nm max. sect. 25 mm <sup>2</sup>		P
8.5.1	Pull test: min sect. ___ 10 mm <sup>2</sup> max sect. ___ 25 mm <sup>2</sup> Pull ___ 50, 100 N for 1 min  During the test conductor does not move noticeably		P
8.5.2	min sect. ___ 10 mm <sup>2</sup> Torque (2/3)= 1,33 Nm max sect. ___ 25 mm <sup>2</sup>  The conductor shows no damage		P
8.5.3	Nominal cross-section from ___ 1 to ___ 25 mm <sup>2</sup>  No of wires ___ 7 Ø of wires ___ 2,14 mm  Torque (2/3) = ___ 1,33Nm  After the test no wire escaped outside		P
7.1.5.2	Terminals allow the connection of conductors of the following cross-sectional areas:		

IEC 60 898				
Cl.	Requirement – Test		Result	Verdict
	Rated current (A)	Range of nominal cross sections to be clamped (mm²)		
	≤ 13	1 to 2,5		
	> 13 ≤ 16	1 to 4		
	> 16 ≤ 25	1,5 to 6		
	> 25 ≤ 32	2,5 to 10		
	> 32 ≤ 50	4 to 16		
	> 50 ≤ 80	10 to 25		
	> 80 ≤ 100	16 to 35		
	> 100 ≤ 125	25 to 50		
	It is required that, for current ratings up to and including 50 A terminals are designed to clamp solid conductors as well as rigid stranded conductors; the use of flexible conductors is permitted			
	Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm² up to 6 mm² are designed to clamp solid conductors only.		10 to 25 mm²	P
7.1.5.3	Means for clamping the conductors in the terminals not serve to fix any other component (See test sub-clause 8.5)			P
7.1.5.4	Terminals for I <sub>N</sub> ≤ 32 A allow the connection of conductors without special preparation		---	N
7.1.5.5	Terminals shall have adequate mechanical strength; ISO thread or equivalent (See tests of sub-clause 8.4 and 8.5.1)			P
7.1.5.6	Clamping of conductor without damage to the conductor (See test of sub-clause 8.5.2)			P
7.1.5.7	Clamping of conductor between metal surfaces (See tests of sub-clause 8.4 and 8.5.1)			P
7.1.5.8	Conductor shall not slip-out when the clamping screw or nuts are tightened (See test of sub-clause 8.5.3)			P
7.1.5.9	Terminals shall be properly fixed. No work loose when the clamping screws or nuts are tightened or loosened (See test of sub-clause 8.4)			P
7.1.5.10	Clamping screws or nuts of terminals for protective conductors adequately secured against accidental loosening		---	N
7.1.5.12	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread, and the screws shall not be of tapping screw type			P
7.1.6	Non interchangeability			
	Plug-in CB not replaceable by another of the same make but having a higher size number without aid of a tool		---	N



IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
7.2	Protection against electric shock		
	Live parts not accessible in normal use		P
	For CB, other than plug-in type, external parts, other than screws and other means for fixing covers, which are accessible shall be of insulating material		P
	Unless the live parts are within an internal enclosure of insulating material: Lining - reliable fixed, - adequate thickness and - mechanical strength		P
	Inlet openings for cables shall be in insulating material or be provided with bushings or similar devices in insulating material Such device - shall be reliable fixed - shall have adequate mechanical strength	---	N
	For plug-in CB, external parts, other than screws and other means for fixing covers, which are accessible shall be in insulating material	---	N
	Metallic operating means insulated from live parts	---	N
	Metal parts of the mechanism not accessible and insulated from accessible metal parts, metal frames (for flush-type), screws or other means for fixing the base		P
	Replacement of plug-in CB possible without touching live parts	---	N
	Lacquer or enamel not considered	---	N
8.6	Test: Use of test finger for 1 min with a force of 75 N		P
7.10	Resistance to heat		
	CB sufficiently resistant to heat		P
8.14	Test of resistance to heat		
8.14.1	Test:		
	- without removable covers..... 1 h (100 ± 2) °C		P
	- removable covers ..... 1 h (70 ± 2) °C	---	N
	After the test no access to live parts, marking still legible		P
8.14.2	Ball pressure test for external parts of insulating material (parts retaining live parts in position) T = 125°C Ø of impression ≤ 2 mm	<2 mm	P

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
8.14.3	Ball pressure test for external parts of insulating material (parts not retaining live parts in position): T = $(70 \pm 2)^{\circ}\text{C}$ or T = $80^{\circ}\text{C} = (40 \pm 2)^{\circ}\text{C} + \text{max. temperature rise of sub-clause 8.8}$ $\varnothing$ of impression $\leq 2 \text{ mm}$	<2 mm	P
7.11	Resistance to abnormal heat and to fire		
	External parts of insulating material shall not ignite or spread fire under fault or overload conditions		P
8.15	Resistance to abnormal heat and to fire		
	Glow wire test: No visible flame, no sustained glowing or flames and glowing extinguish within 30 s		P
	- external parts retaining live parts in position..... $(960 \pm 15)^{\circ}\text{C}$		P
	- other external parts ..... $(650 \pm 10)^{\circ}\text{C}$		P
7.12	Resistance to rusting		
	Ferrous parts adequately protected against rusting		P
8.16	Test of resistance to rusting: (all grease is removed from the parts)		
	- 10 min immersed in a 10% solution of ammonium chloride in water at $20^{\circ}\text{C}$		P
	- 10 min at 95% humidity at $20^{\circ}\text{C}$		P
	- 10 min at $100^{\circ}\text{C}$		P
	No sign of rust		P

	TESTS "B" 3 samples	B1	B2	B3	
7.3	Dielectric properties				
	CB shall have adequate dielectric properties:				P
8.7	Test: 48 h in humidity cabinet 91% to 95%				P
8.7.2	Insulation resistance of the main circuit (DC 500 V)	[M $\Omega$ ]	[M $\Omega$ ]	[M $\Omega$ ]	
	a) In off-position, between the terminals which are electrically connected together when the circuit breaker is in the closed position $\geq 2 \text{ M}\Omega$	>2	>2	>2	P
	b) in off-position, between each pole in turn and the others connected together $\geq 2 \text{ M}\Omega$		---		N
	c) in on-position, between all poles connected together and the frame $\geq 5 \text{ M}\Omega$	>5	>5	>5	P
	d) between metal parts of mechanism and the frame $\geq 5 \text{ M}\Omega$		---		N



IEC 60 898				
Cl.	Requirement – Test	Result		
	e) between the frame and metal foil in contact with the inner surface of the internal enclosure or lining of insulating material $\geq 5 \text{ M}\Omega$	---		
8.7.3	Dielectric strength of the main circuit (acc. cl. 8.7.2)			
	a) 2000 V			
	b) 2000 V	---		
	c) 2000 V			
	d) 2000 V	---		
	e) 2500 V	---		
8.7.4	Dielectric strength of the auxiliary and control circuits			
	1) Between all the auxiliary or control circuits and the frame $U = \text{--- V}$	---		
	2) Between each part of the auxiliary or control circuits which may be isolated from the other parts of the auxiliary or control circuits and these other parts connected together $U = \text{--- V}$ [1000 V if $U_i \leq 60 \text{ V}$ or $2U_i + 1000 \text{ V}$ if $U_i > 60 \text{ V}$ ]	---		
7.4	Temperature rise			
	Temperature rise does not exceed the limiting values stated in table V: sect. $\text{---} 16 \text{ mm}^2$			
8.8.2	Test current: $I_N = 63 \text{ A}$ (reach the steady-state value) - Four-pole CB's: 1) three poles loaded to $I_N \text{ --- A}$ 2) one pole and neutral pole loaded to $I_N \text{ --- A}$			
	Ambient air temperature .....	19,5°C		
	Parts..... Temperature rise [K]	[K]	[K]	[K]
	Terminals for external connections..... 60	max.49,3	max.49,9	max. 48,9
	External parts liable to be touched during manual operation of the circuit-breaker, including operating means of insulating material and metallic means for coupling of insulating operating means of several poles..... 40	max.17,2	max.18,4	max.18,6
	External metallic parts of operating means..... 25	---		
	Other external parts, including that face of the circuit-breaker is in direct contact with the mounting surface ..... 60	---		
8.8.5	Measurement of power losses	B1	B2	B3
	Power losses do not exceed the values stated in table XI A			

IEC 60 898					
Cl.	Requirement – Test	Result			Verdict
	Test current: $I_N = \underline{\hspace{1cm}}$ 63 A (reach the steady state value)				P
	Loaded one pole after the other	---			N
	Table XI A	[W]	[W]	[W]	P
	Rated current $I_N$ (A)	Max. power losses per pole (W)			
	$I_N \leq 10$	3			
	$10 < I_N \leq 16$	3,5			
	$16 < I_N \leq 25$	4,5			
	$25 < I_N \leq 32$	6			
	$32 < I_N \leq 40$	7,5			
	$40 < I_N \leq 50$	9			
	<b><math>50 &lt; I_N \leq 63</math></b>	<b>13</b>			
	$63 < I_N \leq 125$	under consideration			
		5,4	5,7	5,2	
7.5	Uninterrupted duty				
	Circuit-breakers operate reliable even after long service				P
8.9	28 day test: sect. $\underline{\hspace{1cm}}$ 16 mm <sup>2</sup>				P
	28 cycles      - 21 h with current $I_N = \underline{\hspace{1cm}}$ 63A - 3 h without current				
	During the test no tripping during the last period, temperature rise shall be measured				P
	Ambient air temperature .....	22,5°C			
	Parts..... Temperature rise [K]	[K]	[K]	[K]	
	Terminals for external connections ..... 60	50,5	49,2	48,9	P
	The temperature rise does not exceed the value measured during the temperature rise test (subclause 8.8) by more than 15 K				P
	Test current 1,45 $I_N = \underline{\hspace{1cm}}$ 91,35 A				
	- Tripping within				
	- 1h ( $\leq 63$ A)				P
	- 2h ( $> 63$ A)	---			N
	TESTS "C" 3 samples	C1	C2	C3	
7.7	Mechanical and electrical endurance				
	Circuit-breaker shall be capable to perform an adequate number of cycles with rated current				P
8.11	Test: Test Voltage $\underline{\hspace{1cm}}$ 230 V Test Current $\underline{\hspace{1cm}}$ 63 A Sect. $\underline{\hspace{1cm}}$ 16 mm <sup>2</sup>				
	4000 operating cycles				
	- $I_N \leq 32$ A: 2 s on – 13 s off	---			N



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Cl.	Requirement – Test	Result	Verdict
	- $I_N > 32 \text{ A}$ : 2 s on - 28 s off		P
	After the test no damage		P
	Moreover test current.....2,55 $I_N$ 160,65A		
	Opening time not less 1 s or more than	[s] [s] [s]	
	- 60 s ( $\leq 32 \text{ A}$ )	---	N
	- 120 s ( $> 32 \text{ A}$ )	44 – 82	P
	Dielectric strength reduced to 900 V (1500 V acc. IEC 60898)		P
8.12.11.2	Test at reduced short-circuit currents: Fig. 3		
	Test current:		
	- 500 A	---	N
	- 10 $I_N$		P
	Power factor	0,95	--
	Prospective current obtained [A]	630	P
	Sequence: 6-0 and 3-CO	[kA <sup>2</sup> s] [kA <sup>2</sup> s] [kA <sup>2</sup> s]	--
	$I^2t \leq \text{--- kA}^2\text{s}$	$I^2t \leq 70 \text{ kA}^2\text{s}$	P
	- No permanent arcing		P
	- No flash-over between poles or between poles and frame		P
	- No blowing of the fuses F and F'		P
	- Polyethylene foil shows no holes		P
	After the test:		--
	Electric strength test:		
	Test voltage 1500 V (see 8.7.2)		
	a)		P
	b)	---	N
	c)		P
	d)	---	N
	e) 2000 V	---	N

IEC 60 898					
Cl.	Requirement – Test	Result			Verdict
	TESTS "D" 3 samples				
7.6	Automatic operation				
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
8.10	Tests: DO	DO 1	DO 2	DO 3	
	I <sub>N</sub> (A)	63			--
	Sect. (mm²)	16			--
	Instantaneous tripping current	D			--
8.10.1	Test of time-current characteristic				
8.10.1.1	Test current 1,13 I <sub>N</sub> (A) starting from cold for:	71,19 A			--
	- 1 h (I <sub>N</sub> ≤ 63 A)				P
	- 2 h (I <sub>N</sub> > 63 A)	---			N
	No tripping				P
	Then steadily increased within 5 s to 1,45 I <sub>N</sub> (A)	91,35 A			--
	- Tripping within	[min]	[min]	[min]	
	- 1h (≤ 63 A)	33"	30"	34"	P
	- 2h (> 63 A)	---			N
8.10.1.2	Test current 2,55 I <sub>N</sub> (A) starting from cold for:	160,65 A			--
	opening time not less than 1 s or more than	[s]	[s]	[s]	
	- 60 s	---			N
	- 120 s	30	28	29	P
8.10.2	Test of instantaneous tripping:				
8.10.2.1	☐ B - Type				N
	Test current 3I <sub>N</sub> (A), starting from cold				--
	Opening time:	[s]	[s]	[s]	--
	- 0,1s ≤ t ≤ 45s (≤ 32A)				N
	- 0,1s ≤ t ≤ 90s (> 32A)				N
	Test current 5 I <sub>N</sub> (A), starting from cold				N
	Tripping less than 0,1 s				N
8.10.2.2	☐ C - Type				N
	Test current 5I <sub>N</sub> (A), starting from cold				--
	Opening time:	[s]	[s]	[s]	--
	- 0,1s ≤ t ≤ 15s (≤ 32A)				N
	- 0,1s ≤ t ≤ 30s (> 32A)				N
	Test current 10 I <sub>N</sub> (A), starting from cold				N
	Tripping less than 0,1 s				N
8.10.2.3	☐ D - Type				P



IEC 60 898					
Cl.	Requirement – Test	Result			Verdict
	Test current $10I_N$ (A), starting from cold	630 A			--
	Opening time:	[s]	[s]	[s]	--
	- $0,1s \leq t \leq 4s$ ( $\leq 32A$ )	---			N
	- $0,1s \leq t \leq 8s$ ( $> 32A$ )	6	7	7	P
	Test current $20 I_N$ (A), starting from cold	1260 A			
	Tripping less than 0,1 s	0,007	0,008	0,008	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:				N
	Test current 1,1 It (A), (two pole) starting from cold	_____			--
	Tripping within	[min]	[min]	[min]	--
	- 1h				N
	- 2h				N
	Test current 1,2 It (A), (three pole or four pole) starting from cold	_____			--
	Tripping within	[min]	[min]	[min]	--
	- 1h				N
	- 2h				N
8.10.4	Test of effect of ambient temperature on the tripping characteristics				
	a) Ambient temperature of $(-5 \pm 2)^{\circ}C$				P
	Test current $1,13 I_N$ (A)	71,19 A			--
	- Passed for 1h				P
	- Passed for 2h	---			N
	Current is then steadily increased to $1,9 I_N$ (A) within 5s	119,7 A			--
	Tripping within	[min]	[min]	[min]	--
	- 1h	51"	50"	48"	P
	- 2h	---			N
	b) Ambient temperature of $(40 \pm 2)^{\circ}C$				P
	Test current $I_N$ (A)	63			P
	No tripping within				--
	- 1h				P
	- 2h				N

IEC 60 898					
Cl.	Requirement – Test	Result			Verdict
	Tests: D1	D1 <sub>1</sub>	D1 <sub>2</sub>	D1 <sub>3</sub>	
7.9	Resistance to mechanical shock and impact				
	CB shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use				P
8.13.1	Mechanical shock				
	- 50 falls on two sides of vertical board C				P
	- Vertical board turned 90°				P
	- 50 falls on two sides of vertical board C				P
	During the test the circuit-breakers shall not open				P
8.13.2	Mechanical impact				
8.13.2.1	All types:				
	- Impact test: 10 blows-height 10 cm, no damage				P
8.13.2.2	Screw-in types:				N
	- Torque 2,5 Nm for 1 min, no damage				N
8.13.2.3	CB intended to be mounted on a rail and plug-in types:				
	- downward vertical 50 N for 1 min				P
	- upward vertical 50 N for 1 min, no damage				P
8.12.11.3	Test at 1500 A:				
	Prospective current of 1500 A - power factor 0,93 to 0,98				-
	Prospective current obtained (A)	1520 A			--
	Power factor	0,95			--
	Test circuit: figure	3			--
	T (min)	3 min			--
	Distance a (mm)	35 mm			--
	Sequence	6xO, 2xCO			--
	I <sub>Peak</sub> (A) max. value	2200 A			--
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]	--
		17	13	15	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F'				P
	- Polyethylene foil shows no holes				P
	Electric strength test:				
	Test voltage 1500 V (see 8.7.2)				
	a)				P

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
	b)		N
	c)		P
	d)		N
	e) 2000 V		N
8.12.12	Test current equal to 0,85 times of the conventional non-tripping current (starting from cold)	60,51 A	
	- for 1h		P
	- for 2h		N
	Steadily increasing within 5s the current to 1,1 times the conventional tripping current = _____ A	100,49 A	--
	Tripping within 60 min	min min min	
		t < 60 min.	P

	TESTS "E" 3 + 3 samples			
8.12.11.4.2	Test: E1(Test at service short-circuit capacity)	E <sub>1-1</sub>	E <sub>1-2</sub>	E <sub>1-3</sub>
	Service short-circuit capacity .....	7500 A		--
	Test circuit: figure.....	3		--
	Prospective current .....	7500 A		--
	Prospective current obtained .....	7600 A		--
	Power factor .....	0,5		--
	Power factor obtained .....	0,5		--
	Sequence .....	O-O-CO		--
	T (min).....	3 min		--
	Distance a (mm).....	35 mm		--
	I <sub>Peak</sub> (A) max. value.....	13100 A		--
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]
		68 25 18	68 75 65	65 56 56
	- No permanent arcing			P
	- No flash-over between poles or between poles and frame			P
	- No blowing of the fuses F and F'			P
	- Polyethylene foil shows no holes			P
	Electric strength test:			
	Test voltage 1500 V (see 8.7.2)			
	a)			P
	b)			N
	c)			P
	d)			N



IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
	e) 2000 V		N
8.12.12	Test current equal to 0,85 times of the conventional non-tripping current (starting from cold)	60,51 A	
	- for 1h		P
	- for 2h		N
	Steadily increasing within 5s the current to 1,1 times the conventional tripping current (A)	100,49 A	--
	Tripping within 60 min	min min min	
		t < 60 min.	P
8.12.11.4.3	Test: E2 (Test at rated short-circuit capacity)	E <sub>2-1</sub> E <sub>2-2</sub> E <sub>2-3</sub>	
	Rated short-circuit capacity.....:	10000 A	--
	Test circuit: figure.....:	5	--
	Prospective current .....	10000 A	--
	Prospective current obtained .....	10200 A	--
	Power factor .....	0,45-0,5	--
	Power factor obtained .....	0,5	--
	Sequence .....	1xO , 1xCO	--
	T (min).....:	3 min	--
	Distance a (mm).....:	35 mm	--
	I <sub>Peak</sub> (A) max. value.....:	15000 A	--
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s] [kA <sup>2</sup> s] [kA <sup>2</sup> s]	--
		58 56 55 36 47 44	
	- No permanent arcing		P
	- No flash-over between poles or between poles and frame		P
	- No blowing of the fuses F and F'		P
	- Polyethylene foil shows no holes		P
	Electric strength test:		
	Test voltage 900 V (see 8.7.2)		
	a)		P
	b)		N
	c)		P
	d)		N
	e) 2000 V		N
	Test current 2,8 I <sub>N</sub>	176,4 A	
	Tripping within > 0,1 s up to	(s) (s) (s)	
	~ 60 s		N

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
	- 120 s	0,1 s < t < 120 s	P
8.12.11.4.4	Test: E3 (Test at rated short-circuit capacity on an individual pole)	E <sub>3-1</sub> E <sub>3-2</sub> E <sub>3-3</sub>	
	Rated short-circuit capacity on an individual pole I <sub>CN1</sub> .....:	_____ A	--
	Test circuit: figure.....:	_____	--
	Prospective current.....:	_____ A	--
	Prospective current obtained.....:	_____ A	--
	Power factor.....:	_____	--
	Power factor obtained.....:	_____	--
	Sequence.....:	_____	--
	T (min).....:	_____ min	--
	Distance a (mm).....:	_____ mm	--
	I <sub>Peak</sub> (A) max. value.....:	_____ A	--
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s] [kA <sup>2</sup> s] [kA <sup>2</sup> s]	--
			N
	- No permanent arcing		N
	- No flash-over between poles or between poles and frame		N
	- No blowing of the fuses F and F'		N
	- Polyethylene foil shows no holes		N
	Electric strength test:		N
	Test voltage 900 V (see 8.7.2)		N
	a)		N
	b)		N
	c)		N
	d)		N
	e) 2000 V		N
	Test current 2,8 I <sub>N</sub>	_____ A	N
	Tripping within > 0,1 s up to	(s) (s) (s)	N
	- 60 s		N
	- 120 s		N

TEST SEQUENCES		
Test sequence	Clause or Sub-clause	Test (or inspection)
A	5 7.1.1 7.1.2 8.3 7.1.3 7.1.3 7.1.6 8.4 8.5 8.6 8.14 8.15 8.16	Marking General Mechanism Indelibility of marking Clearances and creepage distances (internal parts) Clearances and creepage distances (external parts only) Non-interchangeability Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Resistance to abnormal heat and to fire Resistance to rusting
B	8.7 8.8 8.9	Dielectric properties Temperature rise 28-day test
C	8.11 8.12.11.2 (and 8.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents
D D0	8.10	Tripping characteristic
D D1	8.13 8.12.11.3 (and 8.12.12)	Resistance to mechanical shock and impact Short-circuit performance at 1500 A
E E1	8.12.11.4.3 (and 8.12.12)	Performance at service short-circuit capacity
E E2	8.12.11.4.3 (and 8.12.12)	Performance at rated short-circuit capacity
E E3	8.12.11.4.4 (and 8.12.12)	Performance at rated making and breaking capacity $I_{CN1}$ on an individual pole of multipole circuit breakers
With the agreement of the manufacturer the same samples may be used for more than one test sequence.		



TABLE C.3 - REDUCTION OF SAMPLES FOR SERIES OF CIRCUIT-BREAKERS HAVING DIFFERENT NUMBERS OF POLES				
Test sequence	Number of samples depending on number of poles a)			
	1 pole b)	2 pole c)	3 pole d)	4 pole e)
A	1 maximum rated current	1 maximum rated current g) i)	1 maximum rated current i)	1 maximum rated current i)
B	3 maximum rated current	3 maximum rated current g)	3 maximum rated current	3 maximum rated current
C	3 maximum rated current	3 maximum rated current g)	3 maximum rated current	3 maximum rated current
D0 + D1	3 maximum rated current	3 maximum rated current h)	3 maximum rated current	3 maximum rated current
D0	1 of all other rated currents			
E1	3 + 3 f) maximum rated current 3 + 3 f) minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current
E2	3 + 4 f) maximum rated current 3 + 4 f) minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current
E3	k)	3 maximum rated current j)	3 maximum rated current j)	3 maximum rated current j)
a)	If a test is to be repeated according to the acceptance criteria of C.2, a new set of samples is used for the relevant test sequence. In repeated tests all results shall be satisfactory.			
b)	If only multipole circuit-breakers are submitted, this column applies to the set of samples having the smallest number of poles (instead of the relevant column).			
c)	Applicable to two-pole circuit-breakers whether with two protected poles or with one protected pole.			
d)	This column does not apply if four-pole circuit-breakers are also tested.			
e)	Also applicable to circuit-breakers with three protected poles and a neutral pole.			
f)	Supplementary samples in case of single-pole circuit-breakers rated 230/400 V (see table 1).			
g)	This test sequence shall be omitted when three-pole or four-pole circuit-breakers have been tested.			
h)	This test sequence shall be omitted for two-pole circuit-breakers with two protected poles, when three-pole or four-pole circuit-breakers have been tested.			
i)	When multipole circuit-breakers are submitted, a maximum of four screw-type terminals for external conductors are subjected to the tests of 8.5, i.e. two supply and two load terminals.			
j)	If each pole of the multipole is identical to the individual pole tested in E2, this test is omitted. If not this test is carried out on an individual protected pole, taken at random, of the circuit-breaker with the highest number of poles.			
k)	Covered by test sequence E2			

NUMBER OF SAMPLES FOR FULL TEST PROCEDURE			
Test sequence	Number of samples	Minimum number of samples which shall pass the tests <sup>a) b)</sup>	Number of samples for repeated tests <sup>c)</sup>
A	1	1	-
B	3	2	3
C	3	2 <sup>e)</sup>	3
D	3	2 <sup>e)</sup>	3
E <sub>1</sub>	3+3 <sup>d)</sup>	-	3+3 <sup>d)</sup>
E <sub>2</sub>	3+4 <sup>d)</sup>	2 <sup>e)</sup> + 2 <sup>d)</sup> e) 2 <sup>e)</sup> + 3 <sup>d)</sup> e)	3+4 <sup>d)</sup>
E <sub>3</sub>	3	2 <sup>e)</sup>	3

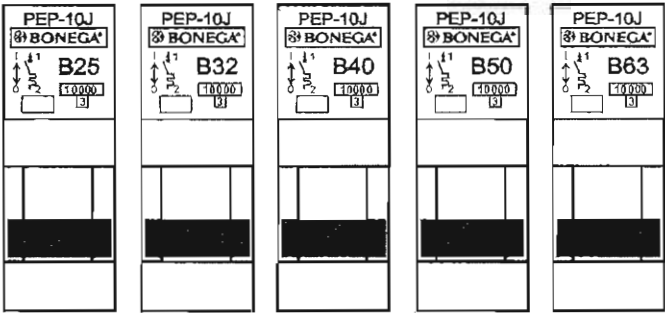
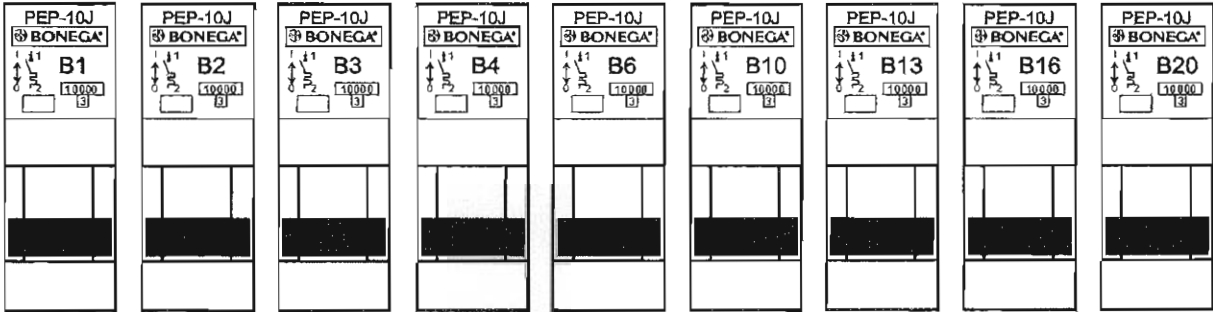
a) In total, a maximum of two test sequences may be repeated.

b) It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design.

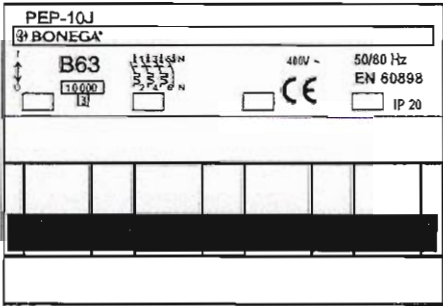
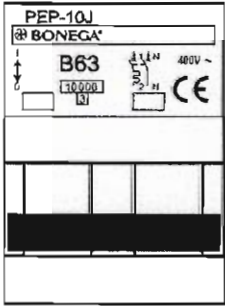
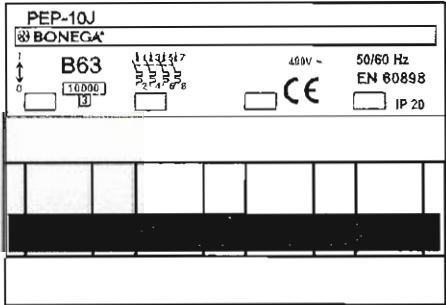
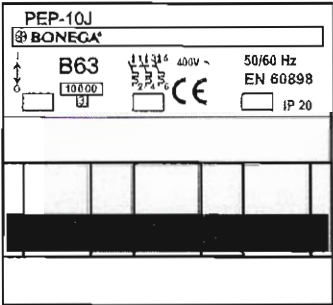
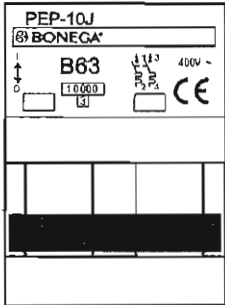
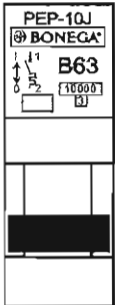
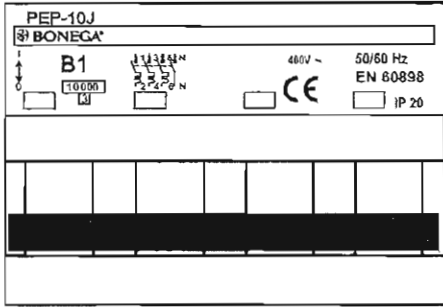
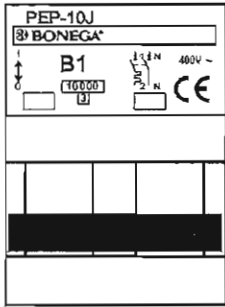
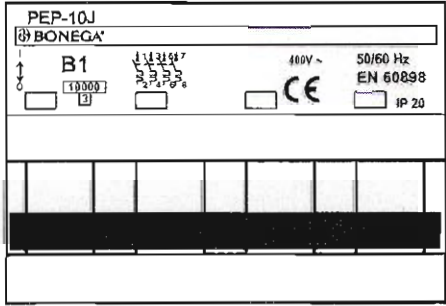
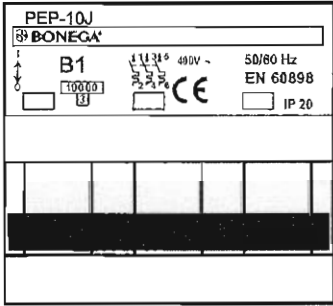
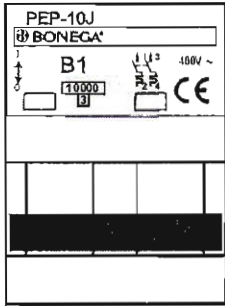
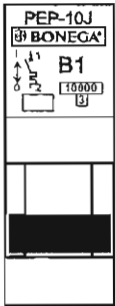
c) In the case of repeated tests, all test results must be acceptable.

d) Supplementary samples in the case of single-pole CB having a rated voltage of 230/400 V.

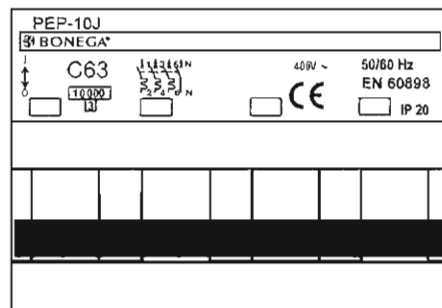
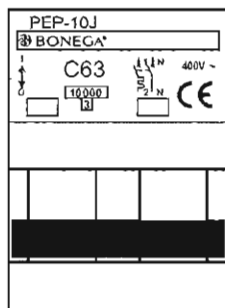
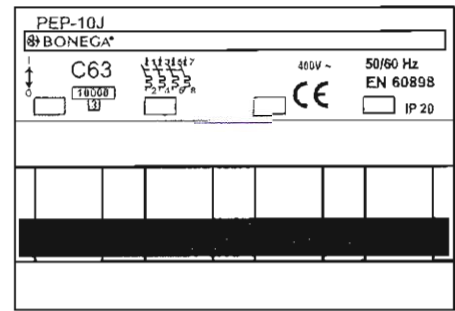
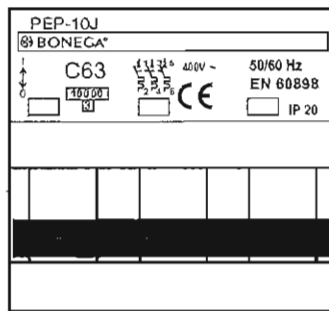
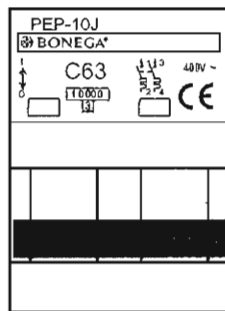
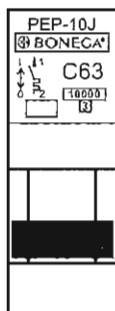
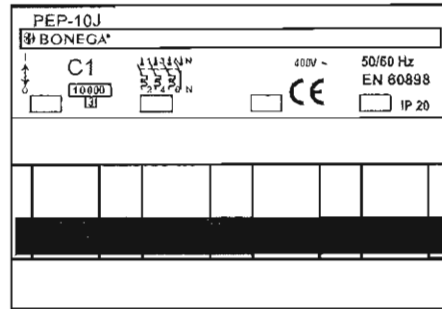
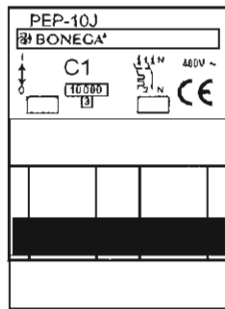
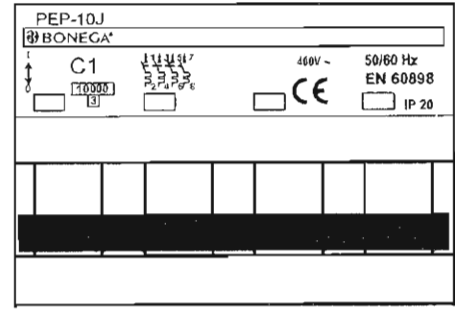
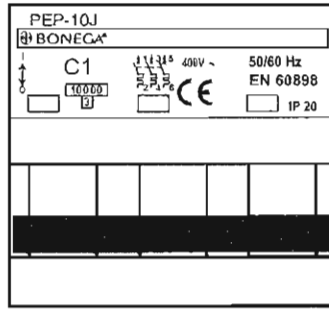
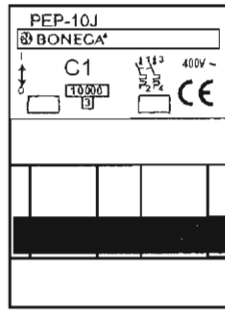
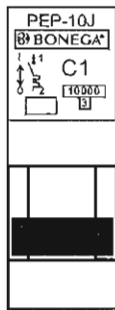
e) All samples shall meet the test requirements of sub-clause 8.12.10, 8.12.11.2, 8.12.11.3 and 8.12.11.4 as appropriate.

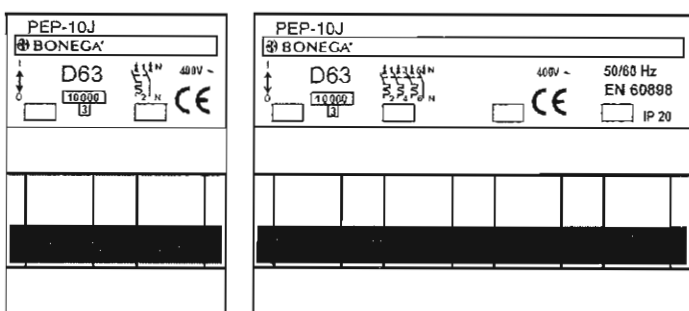
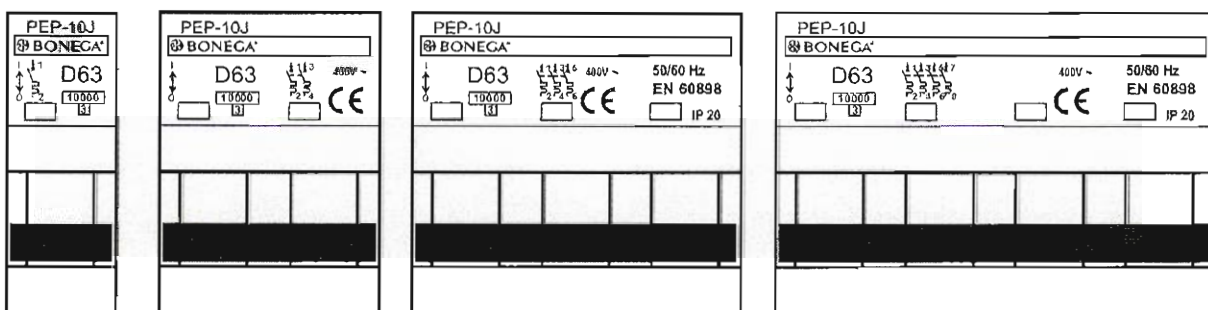
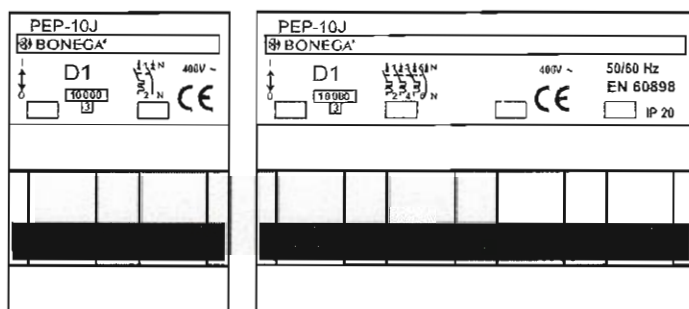
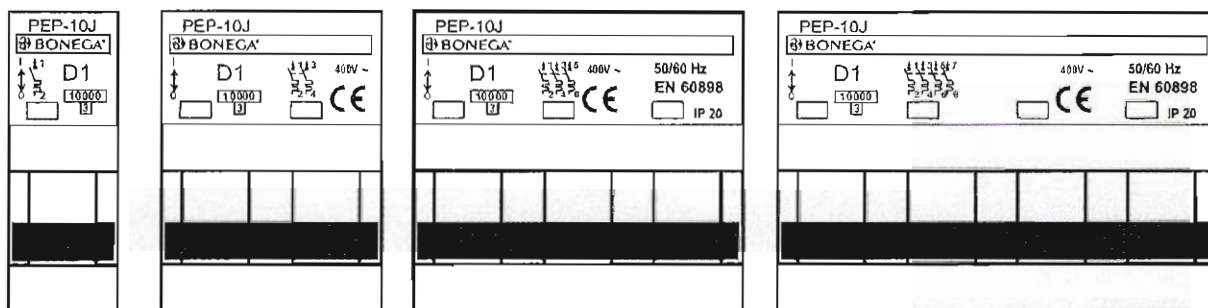


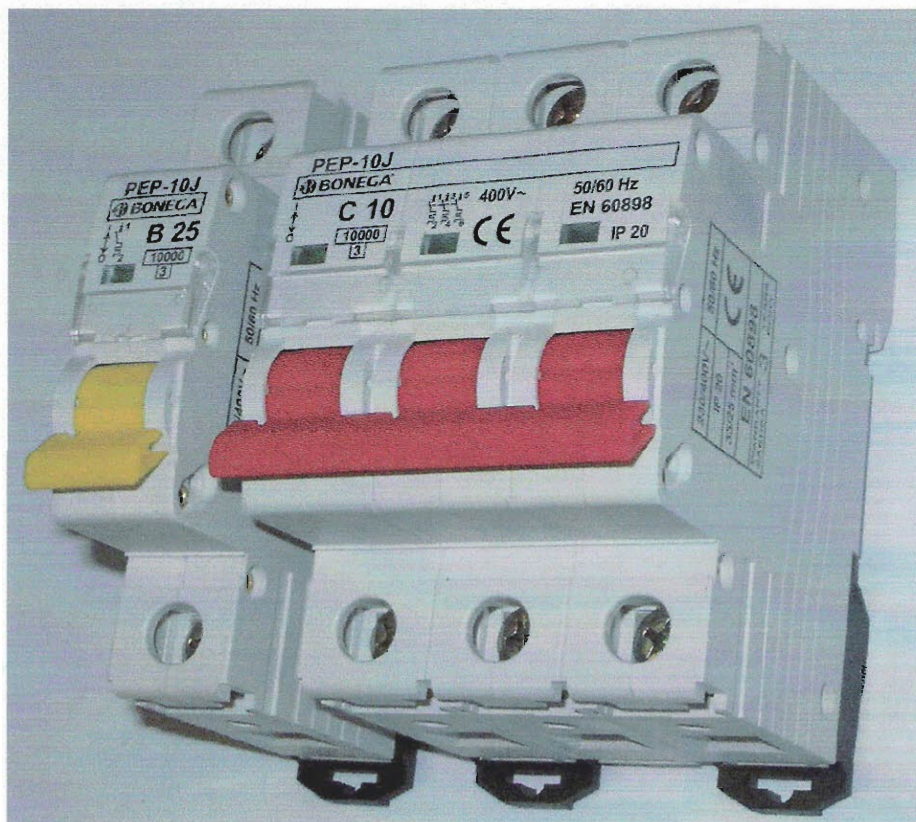
230/400V~	50/60 Hz
IP 20	CE
35/25 mm'	
EN 60898	
WARRANTY ZÁRUKA	3 YEARS ROKY











**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No ..... 500097-01/01/2

Tested by (printed name and  
signature) .....

Jaroslav Klípa

Approved by (printed name and  
signature) .....

Jan Hlavatý

Date of issue ..... 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name ..... Elektrotechnický zkušební ústav

Address ..... Pod Lisem 129

Testing location ..... 171 02 Praha 71-Troja, Czech Republic

Applicant's Name ..... BONEGA Velkoobchod s.r.o.

Address ..... 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard ..... IEC 60898 (2 nd ed):1995

Test procedure ..... CB

Procedure deviation ..... N/A

Non-standard test method ..... N/A

**Test Report Form**

Test Report Form No ..... 60898\_\_A/00-12

TRF originator ..... ÖVE

Master TRF ..... dated 00-07

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Test item description ..... Circuit breakers for overcurrent protection for household and similar installation

Trademark ..... BONEGA

Series ..... PEP-10J

Model and/or type reference ..... PEP-10J D 63 (4p)

Rating(s) ..... AC 400 V, 63 A, 50 Hz



Test items particulars:	
Type of circuit-breaker .....	for overcurrent protection for household and similar installations
Number of poles .....	four-pole
Protection against external influences .....	unenclosed
Method of mounting .....	panel board
Method of connection .....	not associated with the mechanical mounting
Instantaneous tripping current .....	D
Ambient air temperature (°C) .....	30
Energy limiting class .....	----
Rated short-circuit capacity (A) .....	10 000
Type of terminal .....	terminal with stirrup (indirect pressure)
Value of rated operational voltage .....	400 V
Value of rated current .....	63 A
Value of rated frequency .....	50 Hz
Test case verdicts	
Test case does not apply to the test object ..	N(.A.)
Test item does meet the requirement .....	P(ass)
Test item does not meet the requirement .....	F(ail)
Testing	
Date of receipt of test item .....	27.01.2005
Date(s) of performance of test .....	07.02. to 14.02.2005
General remarks	
This report shall not be reproduced except in full without the written approval of the testing laboratory.	
The test results presented in this report relate only to the item(s) tested.	
"(see remark #)" refers to a remark appended to the report.	
"(see Annex #)" refers to an annex appended to the report.	
Throughout this report a comma is used as the decimal separator.	

Copy of marking plate and summary of test results:

See Annex No:1/1-4 of Test Report No:500097-01/01/1

Photograph See Annex No:2/1 of Test Report No:500097-01/01/1

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
5.	MARKING AND OTHER INFORMATION		
	Circuit-breaker marked with:		
	a) Manufacturer's name or trade mark .....	BONEGA	P
	b) Type designation, catalogue number or other identification number .....	PEP-10J D 63 (4p)	P
	c) Rated voltage (V) .....	400	P
	d) Rated current (A) .....	63	P
	e) Rated frequency (Hz) .....	---	N
	f) Rated short circuit capacity (A) .....	10 000	P
	g) Wiring diagram	---	N
	h) Ambient air temperature, ..... if different from 30°C (°C)	---	N
	Symbol for instantaneous tripping current	D	P
	Symbol for nature of supply	~	P
	Marking for rated current and for instantaneous tripping shall be readily visible when CB is installed		P
	Other marking shall be easily discernible		P
	Energy limiting class	---	N
	I <sup>2</sup> t characteristic (documentation)	---	N
	Symbols on supply and load terminal	---	N
	Terminal for neutral conductor N	---	N
	Earthing terminal if any	---	N
	On - off position shall be clearly indicated - 0 I -		P
	For push-button CB the off push-button shall either be red or be marked with the symbol '0'	---	N
	Red not used for other push-button	---	N
	This symbol shall be easily discernible	---	N
	For CB with multiple current ratings, the maximum value is marked, the adjusted value indicated without ambiguity	---	N
	Marking shall be indelible and easily legible (not on removable parts), 15 s with water, 15 s with hexane (see cl. 8.3)		P
7.	REQUIREMENTS FOR CONSTRUCTION AND OPERATION		
7.1.1	General		
7.1.2	Mechanism		

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
	The moving contact shall be mechanically coupled so that all poles make and break together, whether operated manually or automatically, even if an overload occurs on one pole only		P
	The switched neutral shall close before and open after the protected pole (s)	---	N
	Neutral pole having adequate making and breaking capacity and CB with independent manual operation: all poles operate together including neutral pole	---	N
	CB shall have a trip free mechanism		P
	It shall be possible to switch the CB on and off by hand		P
	No intermediate position of the contacts		P
	Position of contacts shall be indicated		P
	Indication visible from the outside		P
	If the indication is on the actuating means, it shall, when released, automatically take up or stay in the position corresponding to that of the moving contacts; operating means shall have two different rest positions, except that, for automatic operation, a third distinct rest position may be provided		P
	The action of the mechanism shall not be influenced by the position of enclosures		P
	If the cover is used as a guiding means for push-button, it shall not be possible to remove this button from the outside	---	N
	Operating means securely fixed, not possible to remove them without a tool		P
	For the up-down operating means the contacts shall be closed by the up movement.		P
7.1.3	Clearances [mm]		
	1.between live parts (of the main circuits) which are separated when the CB is in off position: 3 mm	>3	P
	2.between live parts of different polarity:.....3 mm	---	N
	3.between live parts and:		
	- accessible surfaces of operating means: ..3 mm	>3	P
	- screws or other means for fixing covers: ..3 mm	---	N
	- surface on which the base is mounted:6 (3) mm	>3	P
	- screws or other means for fixing the circuit breaker: ..... 6 (3) mm	>3	P
	- metal covers or boxes:..... 6 (3) mm	>3	P



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Cl.	Requirement – Test	Result	Verdict
	- other accessible metal parts: ..... 3 mm	---	N
	- metal frames supporting the base (flush-type): ..... 3 mm	---	N
	4. Between metal parts of mechanism and:		
	- accessible metal parts: ..... 3 mm	---	N
	- screws or other means for fixing the circuit breaker: ..... 3 mm	---	N
	- metal frames supporting the base (flush type): ..... 3 mm	---	N
7.1.3	Creepage distances [mm]		
	1. Between parts (of the main circuit) which are separated when the CB is in off position 3 mm	>3	P
	2. between live parts of different polarity $U_i \leq 250 \text{ V}$ ..... 3 mm $U_i > 250 \text{ V}$ ..... 4 mm	>4	P
	3. between live parts and:		
	- accessible surfaces of operating means: .. 3 mm	>3	P
	- screws or other means for fixing covers: .. 3 mm	---	N
	- screws or other means for fixing the CB: ..... 6 (3) mm	>3	P
	- accessible metal parts: ..... 3 mm	>3	P
	Note: Live parts in auxiliary circuits: in accordance with subclause 411.1.3.3 of IEC-Publ. 364-4-41		
7.1.4	Screws, current-carrying parts and connections		
7.1.4.1	Connections, withstand mechanical stresses occurring in normal use		P
	Screws for mounting of the CB not of the thread-cutting type	---	N
	Test according to cl. 8.4:		
	- 10 times (screw Ø / torque Nm)	Ø ___ mm ___ Nm Ø ___ mm ___ Nm	N
	- 5 times (screw Ø / torque Nm)	Ø 5,0 mm 2,0 Nm Ø ___ mm ___ Nm	P
	Plug in connections tested by plugging in and pulling out five times	---	N
	After test connections have not become loose nor electrical function impaired		P
7.1.4.2	Screws with a thread of insulating material ensured correct introduction	---	N

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Cl.	Requirement – Test	Result	Verdict
7.1.4.3	Electrical connection: contact pressure not transmitted through insulating material, unless there is sufficient resilience in the metallic parts		P
	- copper		P
	- alloy 58% copper for worked cold parts	---	N
	- alloy 50% copper for other parts	---	N
	- other metal		P
7.1.5	Terminals for external conductors		
7.1.5.1	Terminals ensure correct connection of conductors (Test acc. to cl. 8.5)		P
8.5	Torque Ø 5,0 mm 2,0 Nm Ø ____ mm ____ Nm Ø ____ mm ____ Nm max. sect. 25 mm <sup>2</sup>		P
8.5.1	Pull test: min sect. ____ 10 mm <sup>2</sup> max sect. – 25 mm <sup>2</sup> Pull ____ 50, 100 N for 1 min  During the test conductor does not move noticeably		P
8.5.2	min sect. ____ 10 mm <sup>2</sup> Torque (2/3)= 1,33 Nm max sect. ____ 25 mm <sup>2</sup>  The conductor shows no damage		P
8.5.3	Nominal cross-section from ____ 1 to ____ 25 mm <sup>2</sup>  No of wires ____ 7 Ø of wires ____ 2,14 mm  Torque (2/3) = ____ 1,33Nm  After the test no wire escaped outside		P
7.1.5.2	Terminals allow the connection of conductors of the following cross-sectional areas:		

IEC 60 898																																			
Cl.	Requirement – Test		Verdict																																
	<p>Rated current (A)</p> <p>Range of nominal cross sections to be clamped (mm<sup>2</sup>)</p> <table> <tr> <td>≤ 13</td><td>1</td><td>to</td><td>2,5</td></tr> <tr> <td>&gt; 13 ≤ 16</td><td>1</td><td>to</td><td>4</td></tr> <tr> <td>&gt; 16 ≤ 25</td><td>1,5</td><td>to</td><td>6</td></tr> <tr> <td>&gt; 25 ≤ 32</td><td>2,5</td><td>to</td><td>10</td></tr> <tr> <td>&gt; 32 ≤ 50</td><td>4</td><td>to</td><td>16</td></tr> <tr> <td>&gt; 50 ≤ 80</td><td>10</td><td>to</td><td>25</td></tr> <tr> <td>&gt; 80 ≤ 100</td><td>16</td><td>to</td><td>35</td></tr> <tr> <td>&gt; 100 ≤ 125</td><td>25</td><td>to</td><td>50</td></tr> </table>	≤ 13	1	to	2,5	> 13 ≤ 16	1	to	4	> 16 ≤ 25	1,5	to	6	> 25 ≤ 32	2,5	to	10	> 32 ≤ 50	4	to	16	> 50 ≤ 80	10	to	25	> 80 ≤ 100	16	to	35	> 100 ≤ 125	25	to	50		
≤ 13	1	to	2,5																																
> 13 ≤ 16	1	to	4																																
> 16 ≤ 25	1,5	to	6																																
> 25 ≤ 32	2,5	to	10																																
> 32 ≤ 50	4	to	16																																
> 50 ≤ 80	10	to	25																																
> 80 ≤ 100	16	to	35																																
> 100 ≤ 125	25	to	50																																
	It is required that, for current ratings up to and including 50 A terminals are designed to clamp solid conductors as well as rigid stranded conductors; the use of flexible conductors is permitted																																		
	Nevertheless, it is permitted that terminals for conductors having cross-sections from 1 mm <sup>2</sup> up to 6 mm <sup>2</sup> are designed to clamp solid conductors only.		P																																
		10 to 25 mm <sup>2</sup>																																	
7.1.5.3	Means for clamping the conductors in the terminals not serve to fix any other component (See test sub-clause 8.5)		P																																
7.1.5.4	Terminals for $I_N \leq 32$ A allow the connection of conductors without special preparation		N																																
7.1.5.5	Terminals shall have adequate mechanical strength; ISO thread or equivalent (See tests of sub-clause 8.4 and 8.5.1)		P																																
7.1.5.6	Clamping of conductor without damage to the conductor (See test of sub-clause 8.5.2)		P																																
7.1.5.7	Clamping of conductor between metal surfaces (See tests of sub-clause 8.4 and 8.5.1)		P																																
7.1.5.8	Conductor shall not slip-out when the clamping screw or nuts are tightened (See test of sub-clause 8.5.3)		P																																
7.1.5.9	Terminals shall be properly fixed. No work loose when the clamping screws or nuts are tightened or loosened (See test of sub-clause 8.4)		P																																
7.1.5.10	Clamping screws or nuts of terminals for protective conductors adequately secured against accidental loosening		N																																
7.1.5.12	Screws and nuts of terminals for external conductors shall be in engagement with a metal thread, and the screws shall not be of tapping screw type		P																																
7.1.6	Non interchangeability																																		
	Plug-in CB not replaceable by another of the same make but having a higher size number without aid of a tool		N																																

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Cl.	Requirement – Test	Result	Verdict
7.2	Protection against electric shock		
	Live parts not accessible in normal use		P
	For CB, other than plug-in type, external parts, other than screws and other means for fixing covers, which are accessible shall be of insulating material		P
	Unless the live parts are within an internal enclosure of insulating material: Lining - reliable fixed, - adequate thickness and - mechanical strength		P
	Inlet openings for cables shall be in insulating material or be provided with bushings or similar devices in insulating material Such device - shall be reliable fixed - shall have adequate mechanical strength	---	N
	For plug-in CB, external parts, other than screws and other means for fixing covers, which are accessible shall be in insulating material	---	N
	Metallic operating means insulated from live parts	---	N
	Metal parts of the mechanism not accessible and insulated from accessible metal parts, metal frames (for flush-type), screws or other means for fixing the base		P
	Replacement of plug-in CB possible without touching live parts	---	N
	Lacquer or enamel not considered	---	N
8.6	Test: Use of test finger for 1 min with a force of 75 N		P
7.10	Resistance to heat		
	CB sufficiently resistant to heat		P
8.14	Test of resistance to heat		
8.14.1	Test:		
	- without removable covers..... 1 h (100 ± 2) °C		P
	- removable covers ..... 1 h (70 ± 2) °C	---	N
	After the test no access to live parts, marking still legible		P
8.14.2	Ball pressure test for external parts of insulating material (parts retaining live parts in position) T = 125°C Ø of impression ≤ 2 mm	<2 mm	P

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Cl.	Requirement – Test	Result	Verdict
8.14.3	Ball pressure test for external parts of insulating material (parts not retaining live parts in position): T = $(70 \pm 2)^{\circ}\text{C}$ or T = $80^{\circ}\text{C} = (40 \pm 2)^{\circ}\text{C} + \text{max. temperature rise of sub-clause 8.8}$ $\varnothing$ of impression $\leq 2 \text{ mm}$	<2 mm	P
7.11	Resistance to abnormal heat and to fire		
	External parts of insulating material shall not ignite or spread fire under fault or overload conditions		P
8.15	Resistance to abnormal heat and to fire		
	Glow wire test: No visible flame, no sustained glowing or flames and glowing extinguish within 30 s		P
	- external parts retaining live parts in position..... $(960 \pm 15)^{\circ}\text{C}$		P
	- other external parts ..... $(650 \pm 10)^{\circ}\text{C}$		P
7.12	Resistance to rusting		
	Ferrous parts adequately protected against rusting		P
8.16	Test of resistance to rusting: (all grease is removed from the parts)		
	- 10 min immersed in a 10% solution of ammonium chloride in water at $20^{\circ}\text{C}$		P
	- 10 min at 95% humidity at $20^{\circ}\text{C}$		P
	- 10 min at $100^{\circ}\text{C}$		P
	No sign of rust		P

	TESTS "B" 3 samples	B1	B2	B3	
7.3	Dielectric properties				
	CB shall have adequate dielectric properties:				P
8.7	Test: 48 h in humidity cabinet 91% to 95%				
8.7.2	Insulation resistance of the main circuit (DC 500 V)	[M $\Omega$ ]	[M $\Omega$ ]	[M $\Omega$ ]	
	a) In off-position, between the terminals which are electrically connected together when the circuit breaker is in the closed position $\geq 2 \text{ M}\Omega$	>2	>2	>2	P
	b) in off-position, between each pole in turn and the others connected together $\geq 2 \text{ M}\Omega$		---		N
	c) in on-position, between all poles connected together and the frame $\geq 5 \text{ M}\Omega$	>5	>5	>5	P
	d) between metal parts of mechanism and the frame $\geq 5 \text{ M}\Omega$		---		N



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Cl.	Requirement – Test	Result			Verdict
	e) between the frame and metal foil in contact with the inner surface of the internal enclosure or lining of insulating material $\geq 5 \text{ M}\Omega$	---			N
8.7.3	Dielectric strength of the main circuit (acc. cl. 8.7.2)				
	a) 2000 V				P
	b) 2000 V				P
	c) 2000 V				P
	d) 2000 V	---			N
	e) 2500 V	---			N
8.7.4	Dielectric strength of the auxiliary and control circuits				
	1) Between all the auxiliary or control circuits and the frame $U = \text{--- V}$	---			N
	2) Between each part of the auxiliary or control circuits which may be isolated from the other parts of the auxiliary or control circuits and these other parts connected together $U = \text{--- V}$ [1000 V if $U_i \leq 60 \text{ V}$ or $2U_i + 1000 \text{ V}$ if $U_i > 60 \text{ V}$ ]	---			N
7.4	Temperature rise				
	Temperature rise does not exceed the limiting values stated in table V: sect. $\text{---} 16 \text{ mm}^2$				P
8.8.2	Test current: $I_N = 63 \text{ A}$ (reach the steady-state value) - Four-pole CB's: 1) three poles loaded to $I_N \text{ --- A}$ 2) one pole and neutral pole loaded to $I_N \text{ --- A}$				P
	Ambient air temperature .....	19,5°C			
	Parts..... Temperature rise [K]	[K]	[K]	[K]	
	Terminals for external connections ..... 60	max.49,5	max.50	max.49,8	P
	External parts liable to be touched during manual operation of the circuit-breaker, including operating means of insulating material and metallic means for coupling of insulating operating means of several poles ..... 40	max.18,2	max.20,4	max.19,9	P
	External metallic parts of operating means..... 25	---			N
	Other external parts, including that face of the circuit-breaker is in direct contact with the mounting surface ..... 60	---			N
8.8.5	Measurement of power losses	B1	B2	B3	
	Power losses do not exceed the values stated in table XI A				P

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Cl.	Requirement – Test	Result			Verdict	
	Test current: $I_N = \underline{\hspace{1cm}}$ 63 A (reach the steady state value)				P	
	Loaded one pole after the other	---			N	
	Table XI A	[W]	[W]	[W]	P	
	Rated current $I_N$ (A)	Max. power losses per pole (W)				
	$I_N \leq 10$	3				
	$10 < I_N \leq 16$	3,5				
	$16 < I_N \leq 25$	4,5				
	$25 < I_N \leq 32$	6				
	$32 < I_N \leq 40$	7,5				
	$40 < I_N \leq 50$	9				
	<b><math>50 &lt; I_N \leq 63</math></b>	<b>13</b>				
	$63 < I_N \leq 125$	under consideration				
		5,1-6,1	5,4-6,1	5,2-6,3		
7.5	Uninterrupted duty					
	Circuit-breakers operate reliable even after long service				P	
8.9	28 day test: sect. $\underline{\hspace{1cm}}$ 16 mm <sup>2</sup>				P	
	28 cycles      - 21 h with current $I_N = \underline{\hspace{1cm}}$ 63A - 3 h without current					
	During the test no tripping during the last period, temperature rise shall be measured				P	
	Ambient air temperature .....	22,5 C				
	Parts..... Temperature rise [K]	[K]	[K]	[K]		
	Terminals for external connections ..... 60	51,1-53,2	53,2-54,4	50,1-52,2	P	
	The temperature rise does not exceed the value measured during the temperature rise test (subclause 8.8) by more than 15 K				P	
	Test current $1,45 I_N = \underline{\hspace{1cm}}$ 91,35 A					
	- Tripping within					
	- 1h ( $\leq 63$ A)				P	
	- 2h ( $> 63$ A)	---			N	
	TESTS "C" 3 samples	C1	C2	C3		
7.7	Mechanical and electrical endurance					
	Circuit-breaker shall be capable to perform an adequate number of cycles with rated current				P	
8.11	Test: Test Voltage $\underline{\hspace{1cm}}$ 230 V Test Current $\underline{\hspace{1cm}}$ 63 A Sect. $\underline{\hspace{1cm}}$ 16 mm <sup>2</sup>					
	4000 operating cycles					
	- $I_N \leq 32$ A: 2 s on – 13 s off	---			N	

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Cl.	Requirement – Test	Result	Verdict
	- $I_N > 32 \text{ A}$ : 2 s on - 28 s off		P
	After the test no damage		P
	Moreover test current ..... 2,55 $I_N$ 160,65A		
	Opening time not less 1 s or more than	[s] [s] [s]	
	- 60 s ( $\leq 32 \text{ A}$ )	---	N
	- 120 s ( $> 32 \text{ A}$ )	1s < t < 120 s	P
	Dielectric strength reduced to 900 V (1500 V acc. IEC 60898)		P
8.12.11.2	Test at reduced short-circuit currents: Fig. 3		
	Test current:		
	- 500 A	---	N
	- 10 $I_N$		P
	Power factor	0,95	--
	Prospective current obtained [A]	630	P
	Sequence: 6-0 and 3-CO	[kA <sup>2</sup> s] [kA <sup>2</sup> s] [kA <sup>2</sup> s]	--
	$I^2t \leq \text{---} \text{ kA}^2\text{s}$	$I^2t \leq 70 \text{ kA}^2\text{s}$	P
	- No permanent arcing		P
	- No flash-over between poles or between poles and frame		P
	- No blowing of the fuses F and F'		P
	- Polyethylene foil shows no holes		P
	After the test:		--
	Electric strength test:		
	Test voltage 1500 V (see 8.7.2)		
	a)		P
	b)	---	P
	c)		P
	d)	---	N
	e) 2000 V	---	N

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Cl.	Requirement – Test	Result			Verdict
	TESTS "D" 3 samples				
7.6	Automatic operation				
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
8.10	Tests: DO	DO 1	DO 2	DO 3	
	I <sub>N</sub> (A)	63			--
	Sect. (mm²)	16			--
	Instantaneous tripping current	D			--
8.10.1	Test of time-current characteristic				
8.10.1.1	Test current 1,13 I <sub>N</sub> (A) starting from cold for:	71,19 A			--
	- 1 h (I <sub>N</sub> ≤ 63 A)				P
	- 2 h (I <sub>N</sub> > 63 A)	---			N
	No tripping				P
	Then steadily increased within 5 s to 1,45 I <sub>N</sub> (A)	91,35 A			--
	- Tripping within	[min]	[min]	[min]	
	- 1h (≤ 63 A)	32"	35"	49"	P
	- 2h (> 63 A)	---			N
8.10.1.2	Test current 2,55 I <sub>N</sub> (A) starting from cold for:	160,65 A			--
	opening time not less than 1 s or more than	[s]	[s]	[s]	
	- 60 s	---			N
	- 120 s	29	24	28	P
8.10.2	Test of instantaneous tripping:				
8.10.2.1	<input type="checkbox"/> B - Type				N
	Test current 3I <sub>N</sub> (A), starting from cold	_____			--
	Opening time:	[s]	[s]	[s]	--
	- 0,1s ≤ t ≤ 45s (≤ 32A)				N
	- 0,1s ≤ t ≤ 90s (> 32A)				N
	Test current 5 I <sub>N</sub> (A), starting from cold	_____			N
	Tripping less than 0,1 s				N
8.10.2.2	<input type="checkbox"/> C - Type				N
	Test current 5I <sub>N</sub> (A), starting from cold	_____			--
	Opening time:	[s]	[s]	[s]	--
	- 0,1s ≤ t ≤ 15s (≤ 32A)				N
	- 0,1s ≤ t ≤ 30s (> 32A)				N
	Test current 10 I <sub>N</sub> (A), starting from cold	_____			N
	Tripping less than 0,1 s				N
8.10.2.3	<input type="checkbox"/> D - Type				P

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Cl.	Requirement – Test	Result			Verdict
	Test current $10I_N$ (A), starting from cold	630 A			--
	Opening time:	[s]	[s]	[s]	--
	- $0,1s \leq t \leq 4s$ ( $\leq 32A$ )	---			N
	- $0,1s \leq t \leq 8s$ ( $> 32A$ )	6	8	7	P
	Test current $20 I_N$ (A), starting from cold	1260 A			
	Tripping less than 0,1 s	0,007	0,006	0,007	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:				N
	Test current 1,1 It (A), (two pole) starting from cold	_____			--
	Tripping within	[min]	[min]	[min]	--
	- 1h				N
	- 2h				N
	Test current 1,2 It (A), (three pole or four pole) starting from cold	109,6 A			--
	Tripping within	[min]	[min]	[min]	--
	- 1h	32"	30"	29"	P
	- 2h				N
8.10.4	Test of effect of ambient temperature on the tripping characteristics				
	a) Ambient temperature of $(-5 \pm 2)^{\circ}C$				P
	Test current $1,13 I_N$ (A)	71,19 A			--
	- Passed for 1h				P
	- Passed for 2h	---			N
	Current is then steadily increased to $1,9 I_N$ (A) within 5s	119,7 A			--
	Tripping within	[min]	[min]	[min]	--
	- 1h	52"	48"	47"	P
	- 2h	---			N
	b) Ambient temperature of $(40 \pm 2)^{\circ}C$				P
	Test current $I_N$ (A)	63			P
	No tripping within				--
	- 1h				P
	- 2h				N



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Cl.	Requirement – Test	Result			Verdict
	Tests: D1	D1 <sub>1</sub>	D1 <sub>2</sub>	D1 <sub>3</sub>	
7.9	Resistance to mechanical shock and impact				
	CB shall have adequate mechanical behaviour so as to withstand the stresses imposed during installation and use				P
8.13.1	Mechanical shock				
	- 50 falls on two sides of vertical board C				P
	- Vertical board turned 90°				P
	- 50 falls on two sides of vertical board C				P
	During the test the circuit-breakers shall not open				P
8.13.2	Mechanical impact				
8.13.2.1	All types:				
	- Impact test: 10 blows-height 10 cm, no damage				P
8.13.2.2	Screw-in types:				N
	- Torque 2,5 Nm for 1 min, no damage				N
8.13.2.3	CB intended to be mounted on a rail and plug-in types:				
	- downward vertical 50 N for 1 min				P
	- upward vertical 50 N for 1 min, no damage				P
8.12.11.3	Test at 1500 A:				
	Prospective current of 1500 A - power factor 0,93 to 0,98				-
	Prospective current obtained (A)	1540-1560-1520 A			--
	Power factor	0,95			--
	Test circuit: figure	3			--
	T (min)	3 min			--
	Distance a (mm)	35 mm			--
	Sequence	6xO, 3xCO			--
	I <sub>Peak</sub> (A) max. value	2800-3100-2200 A			--
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]	--
		10-26	10-30	8-31	P
	- No permanent arcing				P
	- No flash-over between poles or between poles and frame				P
	- No blowing of the fuses F and F'				P
	- Polyethylene foil shows no holes				P
	Electric strength test:				
	Test voltage 1500 V (see 8.7.2)				
	a)				P

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Cl.	Requirement – Test	Result	Verdict
	b)		P
	c)		P
	d)		N
	e) 2000 V		N
8.12.12	Test current equal to 0,85 times of the conventional non-tripping current (starting from cold)	60,51 A	
	- for 1h		P
	- for 2h		N
	Steadily increasing within 5s the current to 1,1 times the conventional tripping current = _____ A	100,49 A	--
	Tripping within 60 min	min min min	
		t < 60 min.	P

	TESTS "E" 3 + 3 samples			
8.12.11.4.2	Test: E1(Test at service short-circuit capacity)	E <sub>1-1</sub>	E <sub>1-2</sub>	E <sub>1-3</sub>
	Service short-circuit capacity .....	7500 A		
	Test circuit: figure.....	6		
	Prospective current .....	7500 A		
	Prospective current obtained .....	7500-7600-7500 A		
	Power factor .....	0,5		
	Power factor obtained .....	0,5		
	Sequence .....	O-CO-CO		
	T (min).....	3 min		
	Distance a (mm).....	35 mm		
	I <sub>Peak</sub> (A) max. value.....	-----		
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]	[kA <sup>2</sup> s]
		16-68	10-69	23-69
	- No permanent arcing			
	- No flash-over between poles or between poles and frame			
	- No blowing of the fuses F and F'			
	- Polyethylene foil shows no holes			
	Electric strength test:			
	Test voltage 1500 V (see 8.7.2)			
	a)			
	b)			
	c)			
	d)			

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Cl.	Requirement – Test	Result	Verdict
	e) 2000 V		N
8.12.12	Test current equal to 0,85 times of the conventional non-tripping current (starting from cold)	60,51 A	
	- for 1h		P
	- for 2h		N
	Steadily increasing within 5s the current to 1,1 times the conventional tripping current (A)	100,49 A	--
	Tripping within 60 min	min min min	
		t < 60 min.	
8.12.11.4.3	Test: E2 (Test at rated short-circuit capacity)	E <sub>2-1</sub> E <sub>2-2</sub> E <sub>2-3</sub>	
	Rated short-circuit capacity.....:	10000 A	--
	Test circuit: figure.....:	5	--
	Prospective current.....:	10000 A	--
	Prospective current obtained.....:	10200-10300-10200 A	--
	Power factor.....:	0,5	--
	Power factor obtained.....:	0,5	--
	Sequence.....:	1xO , 1xCO	--
	T (min).....:	3 min	--
	Distance a (mm).....:	35 mm	--
	I <sub>Peak</sub> (A) max. value.....:	15700-17200-15000 A	--
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s] [kA <sup>2</sup> s] [kA <sup>2</sup> s]	--
		28-276 14-182 11-190	
	- No permanent arcing		P
	- No flash-over between poles or between poles and frame		P
	- No blowing of the fuses F and F'		P
	- Polyethylene foil shows no holes		P
	Electric strength test:		
	Test voltage 900 V (see 8.7.2)		
	a)		P
	b)		P
	c)		P
	d)		N
	e) 2000 V		N
	Test current 2,8 I <sub>N</sub>	176,4 A	
	Tripping within > 0,1 s up to	(s) (s) (s)	
	- 60 s		N

IEC 60 898			
Cl.	Requirement – Test	Result	Verdict
	- 120 s	0.1 s < t < 60 min.	P
8.12.11.4.4	Test: E3 (Test at rated short-circuit capacity on an individual pole)	E <sub>3-1</sub> E <sub>3-2</sub> E <sub>3-3</sub>	
	Rated short-circuit capacity on an individual pole I <sub>CN1</sub> .....	_____ A	--
	Test circuit: figure.....	_____	--
	Prospective current.....	_____ A	--
	Prospective current obtained.....	_____ A	--
	Power factor.....	_____	--
	Power factor obtained.....	_____	--
	Sequence.....	_____	--
	T (min).....	_____ min	--
	Distance a (mm).....	_____ mm	--
	I <sub>Peak</sub> (A) max. value.....	_____ A	--
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[kA <sup>2</sup> s] [kA <sup>2</sup> s] [kA <sup>2</sup> s]	--
			N
	- No permanent arcing		N
	- No flash-over between poles or between poles and frame		N
	- No blowing of the fuses F and F'		N
	- Polyethylene foil shows no holes		N
	Electric strength test:		N
	Test voltage 900 V (see 8.7.2)		N
	a)		N
	b)		N
	c)		N
	d)		N
	e) 2000 V		N
	Test current 2,8 I <sub>N</sub>	_____ A	N
	Tripping within > 0,1 s up to	(s) (s) (s)	N
	- 60 s		N
	- 120 s		N

TEST SEQUENCES		
Test sequence	Clause or Sub-clause	Test (or inspection)
A	5 7.1.1 7.1.2 8.3 7.1.3 7.1.3 7.1.6 8.4 8.5 8.6 8.14 8.15 8.16	Marking General Mechanism Indelibility of marking Clearances and creepage distances (internal parts) Clearances and creepage distances (external parts only) Non-interchangeability Reliability of screws, current-carrying parts and connections Reliability of terminals for external conductors Protection against electric shock Resistance to heat Resistance to abnormal heat and to fire Resistance to rusting
B	8.7 8.8 8.9	Dielectric properties Temperature rise 28-day test
C	8.11 8.12.11.2 (and 8.12.12)	Mechanical and electrical endurance Performance at reduced short-circuit currents
D D0	8.10	Tripping characteristic
D D1	8.13 8.12.11.3 (and 8.12.12)	Resistance to mechanical shock and impact Short-circuit performance at 1500 A
E E1	8.12.11.4.3 (and 8.12.12)	Performance at service short-circuit capacity
E E2	8.12.11.4.3 (and 8.12.12)	Performance at rated short-circuit capacity
E E3	8.12.11.4.4 (and 8.12.12)	Performance at rated making and breaking capacity $I_{CN1}$ on an individual pole of multipole circuit breakers
With the agreement of the manufacturer the same samples may be used for more than one test sequence.		



TABLE C.3 - REDUCTION OF SAMPLES FOR SERIES OF CIRCUIT-BREAKERS HAVING DIFFERENT NUMBERS OF POLES

Test sequence	Number of samples depending on number of poles a)			
	1 pole b)	2 pole c)	3 pole d)	4 pole e)
A	1 maximum rated current	1 maximum rated current g) i)	1 maximum rated current i)	1 maximum rated current i)
B	3 maximum rated current	3 maximum rated current g)	3 maximum rated current	3 maximum rated current
C	3 maximum rated current	3 maximum rated current g)	3 maximum rated current	3 maximum rated current
D0 + D1	3 maximum rated current	3 maximum rated current h)	3 maximum rated current	3 maximum rated current
D0	1 of all other rated currents			
E1	3 + 3 f) maximum rated current 3 + 3 f) minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current
E2	3 + 4 f) maximum rated current 3 + 4 f) minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current	3 maximum rated current 3 minimum rated current
E3	k)	3 maximum rated current j)	3 maximum rated current j)	3 maximum rated current j)

- a) If a test is to be repeated according to the acceptance criteria of C.2, a new set of samples is used for the relevant test sequence. In repeated tests all results shall be satisfactory.
- b) If only multipole circuit-breakers are submitted, this column applies to the set of samples having the smallest number of poles (instead of the relevant column).
- c) Applicable to two-pole circuit-breakers whether with two protected poles or with one protected pole.
- d) This column does not apply if four-pole circuit-breakers are also tested.
- e) Also applicable to circuit-breakers with three protected poles and a neutral pole.
- f) Supplementary samples in case of single-pole circuit-breakers rated 230/400 V (see table 1).
- g) This test sequence shall be omitted when three-pole or four-pole circuit-breakers have been tested.
- h) This test sequence shall be omitted for two-pole circuit-breakers with two protected poles, when three-pole or four-pole circuit-breakers have been tested.
- i) When multipole circuit-breakers are submitted, a maximum of four screw-type terminals for external conductors are subjected to the tests of 8.5, i.e. two supply and two load terminals.
- j) If each pole of the multipole is identical to the individual pole tested in E2, this test is omitted. If not this test is carried out on an individual protected pole, taken at random, of the circuit-breaker with the highest number of poles.
- k) Covered by test sequence E2

NUMBER OF SAMPLES FOR FULL TEST PROCEDURE			
Test sequence	Number of samples	Minimum number of samples which shall pass the tests a) b)	Number of samples for repeated tests c)
A	1	1	-
B	3	2	3
C	3	2 <sup>e)</sup>	3
D	3	2 <sup>e)</sup>	3
E <sub>1</sub>	3+3 <sup>d)</sup>	-	3+3 <sup>d)</sup>
E <sub>2</sub>	3+4 <sup>d)</sup>	2 <sup>e)</sup> + 2 <sup>d)</sup> e) 2 <sup>e)</sup> + 3 <sup>d)</sup> e)	3+4 <sup>d)</sup>
E <sub>3</sub>	3	2 <sup>e)</sup>	3

a) In total, a maximum of two test sequences may be repeated.

b) It is assumed that a sample which has not passed a test has not met the requirements due to workmanship or assembly defects which are not representative of the design.

c) In the case of repeated tests, all test results must be acceptable.

d) Supplementary samples in the case of single-pole CB having a rated voltage of 230/400 V.

e) All samples shall meet the test requirements of sub-clause 8.12.10, 8.12.11.2, 8.12.11.3 and 8.12.11.4 as appropriate.

**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No .....: 500097-01/01/3

Tested by (printed name and signature) :

Jaroslav Klípa

Approved by (printed name and signature)

Jan Hlavatý

Date of issue .....: 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name .....: Elektrotechnický zkušební ústav

Address .....: Pod Lisem 129

Testing location .....: 171 02 Praha 71-Troja, Czech Republic

Applicant's Name .....: BONEGA Velkoobchod s.r.o.

Address .....: 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard .....: IEC 60898 (2 nd ed):1995

Test procedure .....: CB

Procedure deviation .....: N/A

Non-standard test method .....: N/A

**Test Report Form**

Test Report Form No. ....: 60898\_\_A/00-12

TRF originator .....: ÖVE

Master TRF .....: dated 00-07

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Test item description .....: Circuit breakers for overcurrent protection for household and similar installation

Trademark .....: BONEGA

Series .....: PEP-10J

Model and/or type reference .....: PEP-10J D I (1p)

Rating(s).....: AC 230/400 V, 1 A, 50 Hz

Test items particulars:	
Type of circuit-breaker .....	for overcurrent protection for household and similar installations
Number of poles .....	single-pole
Protection against external influences .....	unenclosed
Method of mounting .....	panel board
Method of connection .....	not associated with the mechanical mounting
Instantaneous tripping current .....	D
Ambient air temperature (°C) .....	30
Energy limiting class .....	---
Rated short-circuit capacity (A) .....	10 000
Type of terminal .....	terminal with stirrup (indirect pressure)
Value of rated operational voltage .....	230/400 V
Value of rated current .....	1 A
Value of rated frequency .....	50 Hz
Test case verdicts	
Test case does not apply to the test object ..	N(.A.)
Test item does meet the requirement .....	P(ass)
Test item does not meet the requirement .....	F(ail)
Testing	
Date of receipt of test item .....	27.01.2005
Date(s) of performance of test .....	07.02. to 14.02.2005
General remarks	
This report shall not be reproduced except in full without the written approval of the testing laboratory.	
The test results presented in this report relate only to the item(s) tested.	
"(see remark #)" refers to a remark appended to the report.	
"(see Annex #)" refers to an annex appended to the report.	
Throughout this report a comma is used as the decimal separator.	

See Annex No:1/1-4 of Test Report No:500097-01/01/1.

Photograph See Annex No: 2/1 of Test Report No:500097-01/01/1.



IEC 60 898				
	TESTS "D" 3 samples			
7.6	Automatic operation			
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.			P
8.10	Tests: DO	DO 1	DO 2	DO 3
	$I_N$ (A)	1		
	Sect. (mm <sup>2</sup> )	2,5		
	Instantaneous tripping current	D		
8.10.1	Test of time-current characteristic			
8.10.1.1	Test current 1,13 $I_N$ (A) starting from cold for:	1,13 A		
	- 1 h ( $I_N \leq 63$ A)			
	- 2 h ( $I_N > 63$ A)	---		
	No tripping			
	Then steadily increased within 5 s to 1,45 $I_N$ (A)	1,45 A		
	- Tripping within	[min]	[min]	[min]
	- 1h ( $\leq 63$ A)	18"	-----	-----
	- 2h ( $> 63$ A)	---		
8.10.1.2	Test current 2,55 $I_N$ (A) starting from cold for:	2,55 A		
	opening time not less than 1 s or more than	[s]	[s]	[s]
	- 60 s	28"	---	---
	- 120 s	---		
8.10.2	Test of instantaneous tripping:			
8.10.2.1	<input type="checkbox"/> B - Type			N
	Test current 3 $I_N$ (A), starting from cold	_____		
	Opening time:	[s]	[s]	[s]
	- 0,1s $\leq t \leq 45$ s ( $\leq 32$ A)			
	- 0,1s $\leq t \leq 90$ s ( $> 32$ A)			
	Test current 5 $I_N$ (A), starting from cold	_____		
	Tripping less than 0,1 s			
8.10.2.2	<input type="checkbox"/> C - Type			N
	Test current 5 $I_N$ (A), starting from cold	_____		
	Opening time:	[s]	[s]	[s]
	- 0,1s $\leq t \leq 15$ s ( $\leq 32$ A)			
	- 0,1s $\leq t \leq 30$ s ( $> 32$ A)			
	Test current 10 $I_N$ (A), starting from cold	_____		
	Tripping less than 0,1 s			
8.10.2.3	<input type="checkbox"/> D - Type			P
	Test current 10 $I_N$ (A), starting from cold	10 A		
	Opening time:	[s]	[s]	[s]

IEC 60 898				
	- 0,1s ≤ t ≤ 4s (≤ 32A)	8 "	---	P
	- 0,1s ≤ t ≤ 8s (> 32A)		---	N
	Test current 20 I <sub>N</sub> (A), starting from cold		20 A	
	Tripping less than 0,1 s	0,007"	---	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:			N
	Test current 1,1 I <sub>t</sub> (A), (two pole) starting from cold			--
	Tripping within	[min]	[min]	[min]
	- 1h			N
	- 2h			N
	Test current 1,2 I <sub>t</sub> (A), (three pole or four pole) starting from cold			--
	Tripping within	[min]	[min]	[min]
	- 1h			N
	- 2h			N
8.10.4	Test of effect of ambient temperature on the tripping characteristics			
	a) Ambient temperature of (-5 ± 2)°C			P
	Test current 1,13 I <sub>N</sub> (A)		1,13 A	--
	- Passed for 1h			P
	- Passed for 2h		---	N
	Current is then steadily increased to 1,9 I <sub>N</sub> (A) within 5s		1,9 A	--
	Tripping within	[min]	[min]	[min]
	- 1h	55 "	---	P
	- 2h		---	N
	b) Ambient temperature of (40 ± 2)°C			P
	Test current I <sub>N</sub> (A)		1	P
	No tripping within			--
	- 1h			P
	- 2h			N

IEC 60 898				
	TESTS "E" 3 + 3 samples			
8.12.11.4.2	Test: E1(Test at service short-circuit capacity)	E <sub>1-1</sub>	E <sub>1-2</sub>	E <sub>1-3</sub>
	Service short-circuit capacity .....	7500 A		
	Test circuit: figure .....	3		
	Prospective current .....	7500 A		
	Prospective current obtained .....	7500 A		
	Power factor .....	0,5		
	Power factor obtained .....	0,5		
	Sequence .....	O-O-CO		
	T (min) .....	3 min		
	Distance a (mm) .....	35 mm		
	I <sub>Peak</sub> (A) max. value .....	---		
	I <sup>2</sup> t ≤ _____ kA <sup>2</sup> s	[A <sup>2</sup> s]	[A <sup>2</sup> s]	[A <sup>2</sup> s]
		511-222-118	49-592-471	590-380-491
	- No permanent arcing			
	- No flash-over between poles or between poles and frame			
	- No blowing of the fuses F and F'			
	- Polyethylene foil shows no holes			
	Electric strength test:			
	Test voltage 1500 V (see 8.7.2)			
	a)			
	b)			
	c)			
	d)			
	e) 2000 V			
8.12.12	Test current equal to 0,85 times of the conventional non-tripping current (starting from cold)	0,96 A		
	- for 1h			
	- for 2h			
	Steadily increasing within 5s the current to 1,1 times the conventional tripping current (A)	1,6 A		
	Tripping within 60 min	min	min	min
		t < 60 min.		
8.12.11.4.3	Test: E2 (Test at rated short-circuit capacity)	E <sub>2-1</sub>	E <sub>2-2</sub>	E <sub>2-3</sub>
	Rated short-circuit capacity .....	10000 A		
	Test circuit: figure .....	5		
	Prospective current .....	10000 A		
	Prospective current obtained .....	10200 A		

IEC 60 898			
Power factor .....	:	0,5	--
Power factor obtained .....	:	0,5	--
Sequence .....	:	1xO , 1xCO	--
T (min) .....	:	3 min	--
Distance a (mm) .....	:	35 mm	--
$I_{peak}$ (A) max. value .....	:	-----	--
$I^2t \leq$ _____ $kA^2s$		[ $A^2s$ ]      [ $A^2s$ ]      [ $A^2s$ ]	--
		max 498      max 614      max 616	
- No permanent arcing			P
- No flash-over between poles or between poles and frame			P
- No blowing of the fuses F and F'			P
- Polyethylene foil shows no holes			P
Electric strength test:			
Test voltage 900 V (see 8.7.2)			
a)			P
b)			N
c)			P
d)			N
e) 2000 V			N
Test current $2,8 I_N$		1,4 A	
Tripping within > 0,1 s up to		(s)      (s)      (s)	
- 60 s		0,1s < t < 60 s	P
- 120 s			N

**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No .....: 500097-01/01/4

Tested by (printed name and signature) :

Jaroslav Klípa

Approved by (printed name and signature)

Jan Hlavatý

Date of issue .....: 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name .....: Elektrotechnický zkušební ústav

Address .....: Pod Lisem 129

Testing location .....: 171 02 Praha 71-Troja, Czech Republic

Applicant's Name .....: BONEGA Velkoobchod s.r.o.

Address .....: 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard .....: IEC 60898 (2 nd ed):1995

Test procedure .....: CB

Procedure deviation .....: N/A

Non-standard test method .....: N/A

**Test Report Form**

Test Report Form No. ....: 60898 \_\_A/00-12

TRF originator .....: ÖVE

Master TRF .....: dated 00-07

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Test item description .....: Circuit breakers for overcurrent protection for household and similar installation

Trademark .....: BONEGA

Series .....: PEP-10J

Model and/or type reference .....: PEP-10J D 2 (1p)

Rating(s).....: AC 230/400 V, 2 A, 50 Hz



Test items particulars:	
Type of circuit-breaker .....	for overcurrent protection for household and similar installations
Number of poles .....	single-pole
Protection against external influences .....	unenclosed
Method of mounting .....	panel board
Method of connection .....	not associated with the mechanical mounting
Instantaneous tripping current .....	D
Ambient air temperature (°C) .....	30
Energy limiting class .....	---
Rated short-circuit capacity (A) .....	10 000
Type of terminal .....	terminal with stirrup (indirect pressure)
Value of rated operational voltage .....	230/400 V
Value of rated current .....	2 A
Value of rated frequency .....	50 Hz
Test case verdicts	
Test case does not apply to the test object ..	N(.A.)
Test item does meet the requirement .....	P(ass)
Test item does not meet the requirement .....	F(ail)
Testing	
Date of receipt of test item .....	27.01.2005
Date(s) of performance of test .....	07.02. to 14.02.2005
General remarks	
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Throughout this report a comma is used as the decimal separator.	

Copy of marking plate and summary of test results:

See Annex No:1/1-4 of Test Report No:500097-01/01/1.

Photograph See Annex No: 2/1 of Test Report No:500097-01/01/1.

IEC 60898				
	TESTS "D" 3 samples			
7.6	Automatic operation			
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.			P
8.10	Tests: DO	DO 1	DO 2	DO 3
	$I_N$ (A)		2	--
	Sect. (mm <sup>2</sup> )		1	--
	Instantaneous tripping current		D	--
8.10.1	Test of time-current characteristic			
8.10.1.1	Test current $1,13 I_N$ (A) starting from cold for:	2,26 A		--
	- 1 h ( $I_N \leq 63$ A)			P
	- 2 h ( $I_N > 63$ A)		---	N
	No tripping			P
	Then steadily increased within 5 s to $1,45 I_N$ (A)		2,9 A	--
	- Tripping within	[min]	[min]	[min]
	- 1h ( $\leq 63$ A)	52"	-----	-----
	- 2h ( $> 63$ A)		---	N
8.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	5,1 A		--
	opening time not less than 1 s or more than	[s]	[s]	[s]
	- 60 s	24"	---	---
	- 120 s		---	N
8.10.2	Test of instantaneous tripping:			
8.10.2.1	<input type="checkbox"/> B - Type			N
	Test current $3I_N$ (A), starting from cold	_____		--
	Opening time:	[s]	[s]	[s]
	- $0,1s \leq t \leq 45s$ ( $\leq 32A$ )			N
	- $0,1s \leq t \leq 90s$ ( $> 32A$ )			N
	Test current $5 I_N$ (A), starting from cold	_____		N
	Tripping less than 0,1 s			N
8.10.2.2	<input type="checkbox"/> C - Type			N
	Test current $5I_N$ (A), starting from cold	_____		--
	Opening time:	[s]	[s]	[s]
	- $0,1s \leq t \leq 15s$ ( $\leq 32A$ )			N
	- $0,1s \leq t \leq 30s$ ( $> 32A$ )			N
	Test current $10 I_N$ (A), starting from cold	_____		N
	Tripping less than 0,1 s			N
8.10.2.3	<input type="checkbox"/> D - Type			P
	Test current $10I_N$ (A), starting from cold	20 A		--
	Opening time:	[s]	[s]	[s]

IEC 60898			
	- $0,1s \leq t \leq 4s$ ( $\leq 32A$ )	7" --- ---	P
	- $0,1s \leq t \leq 8s$ ( $> 32A$ )	---	N
	Test current $20 I_N$ (A), starting from cold	40 A	
	Tripping less than 0,1 s	0,005" --- ---	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:		N
	Test current 1,1 $I_t$ (A), (two pole) starting from cold	_____	--
	Tripping within	[min] [min] [min]	--
	- 1h		N
	- 2h		N
	Test current 1,2 $I_t$ (A), (three pole or four pole) starting from cold	_____	--
	Tripping within	[min] [min] [min]	--
	- 1h		N
	- 2h		N
8.10.4	Test of effect of ambient temperature on the tripping characteristics		
	a) Ambient temperature of $(-5 \pm 2)^\circ C$		P
	Test current 1,13 $I_N$ (A)	2,26 A	--
	- Passed for 1h		P
	- Passed for 2h	---	N
	Current is then steadily increased to 1,9 $I_N$ (A) within 5s	3,8 A	--
	Tripping within	[min] [min] [min]	--
	- 1h	49" --- ---	P
	- 2h	---	N
	b) Ambient temperature of $(40 \pm 2)^\circ C$		P
	Test current $I_N$ (A)	2 A	P
	No tripping within		--
	- 1h		P
	- 2h		N

**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No .....: 500097-01/01/5

Tested by (printed name and signature) :

Jaroslav Klípa

Approved by (printed name and signature)

Jan Hlavatý

Date of issue .....: 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name .....: Elektrotechnický zkušební ústav

Address .....: Pod Lisem 129

Testing location .....: 171 02 Praha 71-Troja, Czech Republic

Applicant's Name .....: BONEGA Velkoobchod s.r.o.

Address .....: 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard .....: IEC 60898 (2 nd ed):1995

Test procedure .....: CB

Procedure deviation .....: N/A

Non-standard test method .....: N/A

**Test Report Form**

Test Report Form No. ....: 60898\_\_A/00-12

TRF originator .....: ÖVE

Master TRF .....: dated 00-07

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Test item description .....: Circuit breakers for overcurrent protection for household and similar installation

Trademark .....: BONEGA

Series .....: PEP-10J

Model and/or type reference .....: PEP-10J D 3 (1p)

Rating(s).....: AC 230/400 V, 3 A, 50 Hz



## Test items particulars:

Type of circuit-breaker ..... : for overcurrent protection for household and similar installations  
 Number of poles ..... : single-pole  
 Protection against external influences ..... : unenclosed  
 Method of mounting ..... : panel board  
 Method of connection ..... : not associated with the mechanical mounting  
 Instantaneous tripping current ..... : D  
 Ambient air temperature (°C) ..... : 30  
 Energy limiting class ..... : ---  
 Rated short-circuit capacity (A) ..... : 10 000  
 Type of terminal ..... : terminal with stirrup (indirect pressure)  
 Value of rated operational voltage ..... : 230/400 V  
 Value of rated current ..... : 3 A  
 Value of rated frequency ..... : 50 Hz

## Test case verdicts

Test case does not apply to the test object .. : N(.A.)  
 Test item does meet the requirement ..... : P(ass)  
 Test item does not meet the requirement ..... : F(ail)

## Testing

Date of receipt of test item ..... : 27.01.2005  
 Date(s) of performance of test ..... : 07.02. to 14.02.2005

## General remarks

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"(see remark #)" refers to a remark appended to the report.

"(see Annex #)" refers to an annex appended to the report.

Throughout this report a comma is used as the decimal separator.

Copy of marking plate and summary of test results:

See Annex No:1/1-4 of Test Report No:500097-01/01/1.

Photograph See Annex No.2/1 of Test Report No:500097-01/01/1.

IEC 60898				
	TESTS "D" 3 samples			
7.6	Automatic operation			
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.			P
8.10	Tests: DO	DO 1	DO 2	DO 3
	$I_N$ (A)	3		
	Sect. (mm <sup>2</sup> )	1		
	Instantaneous tripping current	D		
8.10.1	Test of time-current characteristic			
8.10.1.1	Test current 1,13 $I_N$ (A) starting from cold for:	3,39 A		
	- 1 h ( $I_N \leq 63$ A)			
	- 2 h ( $I_N > 63$ A)	---		
	No tripping			
	Then steadily increased within 5 s to 1,45 $I_N$ (A)	4,35 A		
	- Tripping within	[min]	[min]	[min]
	- 1h ( $\leq 63$ A)	19"	-----	-----
	- 2h ( $> 63$ A)	---		
8.10.1.2	Test current 2,55 $I_N$ (A) starting from cold for:	7,65 A		
	opening time not less than 1 s or more than	[s]	[s]	[s]
	- 60 s	24"	---	---
	- 120 s	---		
8.10.2	Test of instantaneous tripping:			
8.10.2.1	<input type="checkbox"/> B - Type			N
	Test current 3 $I_N$ (A), starting from cold	_____		
	Opening time:	[s]	[s]	[s]
	- 0,1s $\leq t \leq 45$ s ( $\leq 32$ A)			
	- 0,1s $\leq t \leq 90$ s ( $> 32$ A)			
	Test current 5 $I_N$ (A), starting from cold	_____		
	Tripping less than 0,1 s			
8.10.2.2	<input type="checkbox"/> C - Type			N
	Test current 5 $I_N$ (A), starting from cold	_____		
	Opening time:	[s]	[s]	[s]
	- 0,1s $\leq t \leq 15$ s ( $\leq 32$ A)			
	- 0,1s $\leq t \leq 30$ s ( $> 32$ A)			
	Test current 10 $I_N$ (A), starting from cold	_____		
	Tripping less than 0,1 s			
8.10.2.3	<input type="checkbox"/> D - Type			P
	Test current 10 $I_N$ (A), starting from cold	30 A		
	Opening time:	[s]	[s]	[s]

IEC 60898				
	- $0,1s \leq t \leq 4s$ ( $\leq 32A$ )	5"	---	P
	- $0,1s \leq t \leq 8s$ ( $> 32A$ )		---	N
	Test current $20 I_N$ (A), starting from cold		60 A	
	Tripping less than 0,1 s	0,006"	---	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:			N
	Test current 1,1 It (A), (two pole) starting from cold			--
	Tripping within	[min]	[min]	--
	- 1h			N
	- 2h			N
	Test current 1,2 It (A), (three pole or four pole) starting from cold			--
	Tripping within	[min]	[min]	--
	- 1h			N
	- 2h			N
8.10.4	Test of effect of ambient temperature on the tripping characteristics			
	a) Ambient temperature of $(-5 \pm 2)^\circ C$			P
	Test current 1,13 $I_N$ (A)		3,39 A	--
	- Passed for 1h			P
	- Passed for 2h		---	N
	Current is then steadily increased to 1,9 $I_N$ (A) within 5s		5,7 A	--
	Tripping within	[min]	[min]	--
	- 1h	51"	---	P
	- 2h		---	N
	b) Ambient temperature of $(40 \pm 2)^\circ C$			P
	Test current $I_N$ (A)		3 A	P
	No tripping within			--
	- 1h			P
	- 2h			N

**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No .....: 500097-01/01/6

Tested by (printed name and signature) :

Jaroslav Klípa

Approved by (printed name and signature)

Jan Hlavatý

Date of issue .....: 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name .....: Elektrotechnický zkušební ústav

Address .....: Pod Lisem 129

Testing location .....: 171 02 Praha 7I-Troja, Czech Republic

Applicant's Name .....: BONEGA Velkoobchod s.r.o.

Address .....: 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard .....: IEC 60898 (2 nd ed):1995

Test procedure .....: CB

Procedure deviation .....: N/A

Non-standard test method .....: N/A

**Test Report Form**

Test Report Form No. ....: 60898\_\_A/00-i2

TRF originator .....: ÖVE

Master TRF .....: dated 00-07

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Test item description .....: Circuit breakers for overcurrent protection for household and similar installation

Trademark .....: BONEGA

Series .....: PEP-10J

Model and/or type reference .....: PEP-10J D 4 (1p)

Rating(s).....: AC 230/400 V, 4 A, 50 Hz



Test items particulars:	
Type of circuit-breaker .....	for overcurrent protection for household and similar installations
Number of poles .....	single-pole
Protection against external influences .....	unenclosed
Method of mounting .....	panel board
Method of connection .....	not associated with the mechanical mounting
Instantaneous tripping current .....	D
Ambient air temperature (°C) .....	30
Energy limiting class .....	---
Rated short-circuit capacity (A) .....	10 000
Type of terminal .....	terminal with stirrup (indirect pressure)
Value of rated operational voltage .....	230/400 V
Value of rated current .....	4 A
Value of rated frequency .....	50 Hz
Test case verdicts	
Test case does not apply to the test object ..	N(.A.)
Test item does meet the requirement .....	P(ass)
Test item does not meet the requirement .....	F(ail)
Testing	
Date of receipt of test item .....	27.01.2005
Date(s) of performance of test .....	07.02. to 14.02.2005
General remarks	
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"(see Annex #)" refers to an annex appended to the report.	
Throughout this report a comma is used as the decimal separator.	

Copy of marking plate and summary of test results:

See Annex No:1/1-4 of Test Report No:500097-01/01/1.

Photograph See Annex No:2/1 of Test Report No:500097-01/01/1.

IEC 60898				
	TESTS "D" 3 samples			
7.6	Automatic operation			
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.			P
8.10	Tests: DO	DO 1	DO 2	DO 3
	$I_N$ (A)		4	--
	Sect. (mm <sup>2</sup> )		1	--
	Instantaneous tripping current		D	--
8.10.1	Test of time-current characteristic			
8.10.1.1	Test current $1,13 I_N$ (A) starting from cold for:	4,52 A		--
	- 1 h ( $I_N \leq 63$ A)			P
	- 2 h ( $I_N > 63$ A)		---	N
	No tripping			P
	Then steadily increased within 5 s to $1,45 I_N$ (A)		5,8 A	--
	- Tripping within	[min]	[min]	[min]
	- 1h ( $\leq 63$ A)	17"	-----	-----
	- 2h ( $> 63$ A)		---	N
8.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	10,2 A		--
	opening time not less than 1 s or more than	[s]	[s]	[s]
	- 60 s	24"	---	---
	- 120 s		---	N
8.10.2	Test of instantaneous tripping:			
8.10.2.1	<input type="checkbox"/> B - Type			N
	Test current $3I_N$ (A), starting from cold			--
	Opening time:	[s]	[s]	[s]
	- $0,1s \leq t \leq 45s$ ( $\leq 32A$ )			N
	- $0,1s \leq t \leq 90s$ ( $> 32A$ )			N
	Test current $5 I_N$ (A), starting from cold			N
	Tripping less than 0,1 s			N
8.10.2.2	<input type="checkbox"/> C - Type			N
	Test current $5I_N$ (A), starting from cold			--
	Opening time:	[s]	[s]	[s]
	- $0,1s \leq t \leq 15s$ ( $\leq 32A$ )			N
	- $0,1s \leq t \leq 30s$ ( $> 32A$ )			N
	Test current $10 I_N$ (A), starting from cold			N
	Tripping less than 0,1 s			N
8.10.2.3	<input type="checkbox"/> D - Type			P
	Test current $10I_N$ (A), starting from cold		40 A	--
	Opening time:	[s]	[s]	[s]

IEC 60898				
	- $0,1s \leq t \leq 4s (\leq 32A)$	5"	---	P
	- $0,1s \leq t \leq 8s (> 32A)$		---	N
	Test current $20 I_N$ (A), starting from cold		80 A	
	Tripping less than 0,1 s	0,006"	---	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:			N
	Test current $1,1 I_t$ (A), (two pole) starting from cold			--
	Tripping within	[min]	[min]	--
	- 1h			N
	- 2h			N
	Test current $1,2 I_t$ (A), (three pole or four pole) starting from cold			--
	Tripping within	[min]	[min]	--
	- 1h			N
	- 2h			N
8.10.4	Test of effect of ambient temperature on the tripping characteristics			
	a) Ambient temperature of $(-5 \pm 2)^\circ C$			P
	Test current $1,13 I_N$ (A)		4,52 A	--
	- Passed for 1h			P
	- Passed for 2h		---	N
	Current is then steadily increased to $1,9 I_N$ (A) within 5s		7,6 A	--
	Tripping within	[min]	[min]	--
	- 1h	45"	---	P
	- 2h		---	N
	b) Ambient temperature of $(40 \pm 2)^\circ C$			P
	Test current $I_N$ (A)		4 A	P
	No tripping within			--
	- 1h			P
	- 2h			N

**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No .....: 500097-01/01/7

Tested by (printed name and signature) :

Jaroslav Klípa

Approved by (printed name and signature)

Jan Hlavatý

Date of issue .....: 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name .....: Elektrotechnický zkušební ústav

Address .....: Pod Lisem 129

Testing location .....: 171 02 Praha 71-Troja, Czech Republic

Applicant's Name .....: BONEGA Velkoobchod s.r.o.

Address .....: 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard .....: IEC 60898 (2 nd ed):1995

Test procedure .....: CB

Procedure deviation .....: N/A

Non-standard test method .....: N/A

**Test Report Form**

Test Report Form No. ....: 60898\_\_A/00-12

TRF originator .....: ÖVE

Master TRF .....: dated 00-07

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Test item description .....: Circuit breakers for overcurrent protection for household and similar installation

Trademark .....: BONEGA

Series .....: PEP-10J

Model and/or type reference .....: PEP-10J D 6 (1p)

Rating(s).....: AC 230/400 V, 6 A, 50 Hz

## Test items particulars:

Type of circuit-breaker ..... : for overcurrent protection for household and similar installations  
 Number of poles ..... : single-pole  
 Protection against external influences ..... : unenclosed  
 Method of mounting ..... : panel board  
 Method of connection ..... : not associated with the mechanical mounting  
 Instantaneous tripping current ..... : D  
 Ambient air temperature (°C) ..... : 30  
 Energy limiting class ..... : ---  
 Rated short-circuit capacity (A) ..... : 10 000  
 Type of terminal ..... : terminal with stirrup (indirect pressure)  
 Value of rated operational voltage ..... : 230/400 V  
 Value of rated current ..... : 6 A  
 Value of rated frequency ..... : 50 Hz

## Test case verdicts

Test case does not apply to the test object .. : N(A.)  
 Test item does meet the requirement ..... : P(ass)  
 Test item does not meet the requirement ..... : F(ail)

## Testing

Date of receipt of test item ..... : 27.01.2005  
 Date(s) of performance of test ..... : 07.02. to 14.02.2005

## General remarks

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"(see Annex #)" refers to an annex appended to the report.

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Copy of marking plate and summary of test results:

See Annex No:1/1-4 of Test Report No:500097-01/01/1.

Photograph See Annex No:2/1 of Test Report No:500097-01/01/1.

IEC 60898				
	TESTS "D" 3 samples			
7.6	Automatic operation			
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.			P
8.10	Tests: DO	DO 1	DO 2	DO 3
	$I_N$ (A)	6		
	Sect. (mm <sup>2</sup> )	1		
	Instantaneous tripping current	D		
8.10.1	Test of time-current characteristic			
8.10.1.1	Test current $1,13 I_N$ (A) starting from cold for:	6,78 A		
	- 1 h ( $I_N \leq 63$ A)			
	- 2 h ( $I_N > 63$ A)	---		
	No tripping			
	Then steadily increased within 5 s to $1,45 I_N$ (A)	8,7 A		
	- Tripping within	[min]	[min]	[min]
	- 1h ( $\leq 63$ A)	8"	-----	-----
	- 2h ( $> 63$ A)	---		
8.10.1.2	Test current $2,55 I_N$ (A) starting from cold for:	15,3 A		
	opening time not less than 1 s or more than	[s]	[s]	[s]
	- 60 s	10"	---	---
	- 120 s	---		
8.10.2	Test of instantaneous tripping:			
8.10.2.1	<input type="checkbox"/> B - Type			N
	Test current $3I_N$ (A), starting from cold	_____		
	Opening time:	[s]	[s]	[s]
	- $0,1s \leq t \leq 45s$ ( $\leq 32A$ )			
	- $0,1s \leq t \leq 90s$ ( $> 32A$ )			
	Test current $5 I_N$ (A), starting from cold	_____		
	Tripping less than 0,1 s			
8.10.2.2	<input type="checkbox"/> C - Type			N
	Test current $5I_N$ (A), starting from cold	_____		
	Opening time:	[s]	[s]	[s]
	- $0,1s \leq t \leq 15s$ ( $\leq 32A$ )			
	- $0,1s \leq t \leq 30s$ ( $> 32A$ )			
	Test current $10 I_N$ (A), starting from cold	_____		
	Tripping less than 0,1 s			
8.10.2.3	<input type="checkbox"/> D - Type			P
	Test current $10I_N$ (A), starting from cold	60 A		
	Opening time:	[s]	[s]	[s]

IEC 60898				
	- 0,1s ≤ t ≤ 4s (≤ 32A)	3"	---	P
	- 0,1s ≤ t ≤ 8s (> 32A)		---	N
	Test current 20 I <sub>N</sub> (A), starting from cold		120 A	
	Tripping less than 0,1 s	0,008"	---	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:			N
	Test current 1,1 I <sub>t</sub> (A), (two pole) starting from cold			--
	Tripping within	[min]	[min]	[min]
	- 1h			N
	- 2h			N
	Test current 1,2 I <sub>t</sub> (A), (three pole or four pole) starting from cold			--
	Tripping within	[min]	[min]	[min]
	- 1h			N
	- 2h			N
8.10.4	Test of effect of ambient temperature on the tripping characteristics			
	a) Ambient temperature of (-5 ± 2)°C			P
	Test current 1,13 I <sub>N</sub> (A)		6,78 A	--
	- Passed for 1h			P
	- Passed for 2h		---	N
	Current is then steadily increased to 1,9 I <sub>N</sub> (A) within 5s		11,4 A	--
	Tripping within	[min]	[min]	[min]
	- 1h	22"	---	P
	- 2h		---	N
	b) Ambient temperature of (40 ± 2)°C			P
	Test current I <sub>N</sub> (A)		6 A	P
	No tripping within			--
	- 1h			P
	- 2h			N

**TEST REPORT****IEC 60 898****Circuit-Breakers for overcurrent protection for  
household and similar installation**

Report reference No .....: 500097-01/01/8

Tested by (printed name and signature) :

Jaroslav Klípa

Approved by (printed name and signature)

Jan Hlavatý

Date of issue .....: 14.02.2005

This report is based on a blank test report that was prepared by SGS Fimko Ltd using information obtained from the TRF originator (see below).

Testing Laboratory Name .....: Elektrotechnický zkušební ústav

Address .....: Pod Lisem 129

Testing location .....: 171 02 Praha 71-Troja, Czech Republic

Applicant's Name .....: BONEGA Velkoobchod s.r.o.

Address .....: 696 66 Sudoměřice nad Moravou 302, Czech Republic

**Test specification**

Standard .....: IEC 60898 (2 nd ed):1995

Test procedure .....: CB

Procedure deviation .....: N/A

Non-standard test method .....: N/A

**Test Report Form**

Test Report Form No. ....: 60898\_\_A/00-12

TRF originator .....: ÖVE

Master TRF .....: dated 00-07

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Test item description .....: Circuit breakers for overcurrent protection for household and similar installation

Trademark .....: BONEGA

Series .....: PEP-10J

Model and/or type reference .....: PEP-10J D 10 (1p)

Rating(s).....: AC 230/400 V, 10 A, 50 Hz

## Test items particulars:

Type of circuit-breaker ..... : for overcurrent protection for household and similar installations  
 Number of poles ..... : single-pole  
 Protection against external influences ..... : unenclosed  
 Method of mounting ..... : panel board  
 Method of connection ..... : not associated with the mechanical mounting  
 Instantaneous tripping current ..... : D  
 Ambient air temperature (°C) ..... : 30  
 Energy limiting class ..... : ---  
 Rated short-circuit capacity (A) ..... : 10 000  
 Type of terminal ..... : terminal with stirrup (indirect pressure)  
 Value of rated operational voltage ..... : 230/400 V  
 Value of rated current ..... : 10 A  
 Value of rated frequency ..... : 50 Hz

## Test case verdicts

Test case does not apply to the test object .. : N(.A.)  
 Test item does meet the requirement ..... : P(ass)  
 Test item does not meet the requirement ..... : F(ail)

## Testing

Date of receipt of test item ..... : 27.01.2005  
 Date(s) of performance of test ..... : 07.02. to 14.02.2005

## General remarks

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The test results presented in this report relate only to the item(s) tested.

”(see remark #)” refers to a remark appended to the report.

”(see Annex #)” refers to an annex appended to the report.

Throughout this report a comma is used as the decimal separator.

Copy of marking plate and summary of test results:

See Annex No:1/1-4 of Test Report No:500097-01/01/1.

Photograph See Annex No:2/1 of Test Report No:500097-01/01/1.



## IEC 60898

	TESTS "D" 3 samples				
7.6	Automatic operation				
	Tripping characteristic of CB ensures adequate protection of the circuit, without premature operation.				P
8.10	Tests: DO	DO 1	DO 2	DO 3	
	$I_N$ (A)		10		--
	Sect. (mm <sup>2</sup> )		1,5		--
	Instantaneous tripping current		D		--
8.10.1	Test of time-current characteristic				
8.10.1.1	Test current 1,13 $I_N$ (A) starting from cold for:		11,3 A		--
	- 1 h ( $I_N \leq 63$ A)				P
	- 2 h ( $I_N > 63$ A)		---		N
	No tripping				P
	Then steadily increased within 5 s to 1,45 $I_N$ (A)		14,5 A		--
	- Tripping within	[min]	[min]	[min]	
	- 1h ( $\leq 63$ A)	9"	-----	-----	P
	- 2h ( $> 63$ A)		---		N
8.10.1.2	Test current 2,55 $I_N$ (A) starting from cold for:		25,5 A		--
	opening time not less than 1 s or more than	[s]	[s]	[s]	
	- 60 s	10"	---	---	P
	- 120 s		---		N
8.10.2	Test of instantaneous tripping:				
8.10.2.1	<input type="checkbox"/> B - Type				N
	Test current 3 $I_N$ (A), starting from cold		-----		--
	Opening time:	[s]	[s]	[s]	--
	- 0,1s $\leq t \leq 45$ s ( $\leq 32$ A)				N
	- 0,1s $\leq t \leq 90$ s ( $> 32$ A)				N
	Test current 5 $I_N$ (A), starting from cold		-----		N
	Tripping less than 0,1 s				N
8.10.2.2	<input type="checkbox"/> C - Type				N
	Test current 5 $I_N$ (A), starting from cold		-----		--
	Opening time:	[s]	[s]	[s]	--
	- 0,1s $\leq t \leq 15$ s ( $\leq 32$ A)				N
	- 0,1s $\leq t \leq 30$ s ( $> 32$ A)				N
	Test current 10 $I_N$ (A), starting from cold		-----		N
	Tripping less than 0,1 s				N
8.10.2.3	<input type="checkbox"/> D - Type				P
	Test current 10 $I_N$ (A), starting from cold		100 A		--
	Opening time:	[s]	[s]	[s]	--

## IEC 60898

	- $0,1s \leq t \leq 4s$ ( $\leq 32A$ )	4"	---	---	P
	- $0,1s \leq t \leq 8s$ ( $> 32A$ )		---		N
	Test current $20 I_N$ (A), starting from cold		200 A		
	Tripping less than 0,1 s	0,007"	---	---	P
8.10.3	Test of effect of single pole loading on the tripping characteristic of multipole circuit-breakers:				N
	Test current 1,1 It (A), (two pole) starting from cold				--
	Tripping within	[min]	[min]	[min]	--
	- 1h				N
	- 2h				N
	Test current 1,2 It (A), (three pole or four pole) starting from cold				--
	Tripping within	[min]	[min]	[min]	--
	- 1h				N
	- 2h				N
8.10.4	Test of effect of ambient temperature on the tripping characteristics				
	a) Ambient temperature of $(-5 \pm 2)^\circ C$				P
	Test current 1,13 $I_N$ (A)		11,3 A		--
	- Passed for 1h				P
	- Passed for 2h		---		N
	Current is then steadily increased to 1,9 $I_N$ (A) within 5s		19 A		--
	Tripping within	[min]	[min]	[min]	--
	- 1h	20"	---	---	P
	- 2h		---		N
	b) Ambient temperature of $(40 \pm 2)^\circ C$				P
	Test current $I_N$ (A)		10 A		P
	No tripping within				--
	- 1h				P
	- 2h				N

## E Z Ů P r a h a n a b í z í :

- zkoušení výrobků z hlediska elektrické a mechanické bezpečnosti, EMC, hluku, vibrací apod., včetně vypracování kompletních zkušebních protokolů,
- certifikaci výrobků jako podklad pro posouzení shody,
- značku ESČ a certifikát EZÚ označující shodu vlastností výrobku s požadavky technických norem pro elektrickou bezpečnost,
- mezinárodně uznávané certifikáty CCA, CB a EMEDCA,
- celoevropské značky ENEC a KEYMARK označující shodu vlastností výrobku s požadavky technických norem pro elektrickou bezpečnost,
- značku CCA-EMC označující shodu vlastností výrobku s požadavky technických norem pro EMC,
- certifikaci dle norem ČSN EN ISO 9000 a 14 001, ČSN EN 46 000 a BS 8800,
- certifikáty pro systémy řízení: EZÚ, CQS a IQNet,
- posouzení dokumentace výrobku,
- přípravu prohlášení o shodě podle zákona 22/97 Sb. i pro značení CE,
- metrologické služby,
- školení, konzultace.

## E Z Ů P r a g u e o f f e r s :

- testing of products from the point of view of their electrical and mechanical safety, EMC, noise, vibration, etc., including the preparation of complete test reports,
- certification of products as basic material for the preparation of the Conformity Declaration,
- ESČ Mark and the EZÚ Certificate indicating the conformity of the properties of the given product with the requirements of the standards for electrical safety,
- internationally acknowledged CCA, CB and EMEDCA Certificates,
- Pan-European marks ENEC and KEYMARK indicating the conformity of the properties of a product with the requirements of the standards for electrical safety,
- the CCA-EMC Mark indicating conformity of the properties of the product with the requirements of the standards concerning EMC,
- certification in compliance with the standards EN ISO 9000 and EN ISO 14 001, EN 46 000 and BS 8800,
- EZÚ, CQS and IQNet Certificates for Systems of Management,
- assessment of the documentation of a product,
- elaboration of the Conformity Declaration,
- metrological services,
- training, consultations.

